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ABSTRACT

The purpose of this study was to estimate the costs in both money and teachers' and administrators' time required to implement the School Planning Evaluation and Communication System (SPECS). The primary source of data was the SPECS field test site activities records maintained by the SPECS development team. Costs were calculated for each district. Overall, costs of installing the SPECS system were difficult to assess, and conclusions were tentative. Results revealed that the cost of conducting a systems analysis of a district may range from five person-days to several months, depending on the level of detail desired and the size of and complexity of the district. The cost of changing to a program budget will be high unless the district is very small or shares a system with other districts. The third component, made up of program planning, implementation, documentation, evaluation, and replanning, is the most intricate of the components and the one for which costs are the most difficult to assess. Implementation is the most costly phase of this component. Data on components four (community goal definition) and five (policy-making) are sketchy but the costs of implementing these components are not sizeable. A lengthy appendix contains details of cost analysis data and data analysis.
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Wide and Deep
An Assessment of the Nature and Magnitude of the Costs of Implementing SPECS

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Eugene, OR 97401

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INTRODUCTION

In 1832, the Franklin Institute of Philadelphia was contracted by the federal government to study the problems of exploding boilers in American steamboats. From this beginning, the world of research and development has continued to grow, now involving many disparate enterprises. The major period of research and development growth has come since the onset of World War II, with 25 to 30 billion dollars now being spent each year in this area.[1]

Although attention has been focused on many areas, little money has been spent on educational research and development until recently. Despite the widespread affection of Americans for education, (Jesse Burkhead quips it is second only to our love for cars[2]) many Americans, in the past, feared the effects of federal aid in education. Racial integration and centralized control were thought to be two inevitable accompaniments of federal aid, and most Americans felt that these constraints would not be worth the benefits which would be derived.

It was not until Sputnik and the civil rights movement that the federal government became involved to any extent in education, and not until 1965 and the passage of the Elementary and Secondary Education Act that federal aid began to flow in an amount great enough to have an important impact on the world of educational research.

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[1]Paul Dickson, Think Tanks (New York, N.Y. 1971), pp. 8-9

[2]Jesse Burkhead, "Economics Against Education," Teacher College Record, Vol. LXXIV, No. 2 (December, 1973), p. 194.

The first big surprise to American educators provided by federal research and development funds was the report, Equality of Educational Opportunity (1966),[3] which seemed to indicate that the facilities in educational opportunities available to minorities and poor were substantially the same as those available to others. What was even more disturbing was that the report indicated that the achievement levels of children were more closely associated with their social class and family background than with anything provided to them in the schools. Despite a host of unanswered questions, such conclusions inevitably raised questions in many citizens' minds about the efficacy of education.

To make matters more difficult educational costs were rising dramatically. In 1966 the United States was in the middle of a period of enormous growth of the school age population. Enrollment in regular elementary and secondary schools went from 43 million children in 1961 to 51 million in 1971.[4] This increase in population necessitated the construction of hundreds of new buildings. It was also during the 1960's that teacher salaries rose. During that decade total annual expenditures, in constant dollars, doubled.[5]

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[3]James S. Coleman, et al., Equality of Educational Opportunity (Washington, DC, 1966).

[4]National Center for Educational Statistics, Projections of Education Statistics to 1981-82 (Washington, DC, 1972), pp. 13, 78.

[5]Loc. cit.

Demands for accountability. Questions about the success of schools in teaching children the basic skills, coupled with a growth in the number of dollars required to provide these services, gave rise to doubts about the efficiency with which educational funds were being expended. At the same time, pressure had been building in the federal government for new ways to stem growth in spending, particularly in the military, and also for methods of setting priorities in the federal budget. Robert S. McNamara and Charles J. Hitch came to the Department of Defense in 1961 with promises of more efficient and effective desision making.[6]

McNamara's system involved setting priorities and measuring the cost effectiveness of various techniques, followed by evaluation of projected alternative outcomes. In general, the whole procedure could be characterized as a "systems approach" during which an entire system was scrutinized to reveal the most effective method of operation. The systems approach was attractive mainly to large organizations, where complicated sets of activities made it difficult to determine the most efficient method of operation.

Educational agencies were also facing a number of new questions on programs, technologies, and budgets, particularly in the wake of new options brought forth under the stimulus of federal dollars. The new federal programs necessitated local decision making to determine the best method for meeting the needs of the children. Furthermore, each program had to be evaluated. And, because federal funds were being added to the local

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[6]Ida R. Hoos, Systems Analysis in Public Policy: A Critique (Berkeley, CA, 1972), pp. 45-46.

and state funds which the district had been receiving, many districts' budgeting procedures were no longer adequate to meet their needs.

To answer these needs, interest grew in developing systems for local program planning and decision making. Such systems would have to provide needs assessment, program planning, budgeting, and evaluation--common components for rational decision making, to be sure. However, such systems were often complex and difficult for educators who were undergoing such activities for the first time to understand.

These activities can generally be characterized as being related to the systems approach in education. A number of activities took place in the Department of Health, Education and Welfare to further the efforts of local districts in this direction. In addition to reworking the familiar budget chart of accounts into a program structure, the federal government sponsored a seemingly endless procession of innovations. Both Title III and IV of the Elementary and Secondary Education Act of 1965 involved research and development on systems for improving instruction. Title III gave money to the states to allocate among school districts for implementing innovative programs. Title IV, on the other hand, extended the Cooperative Research Act of 1954; in essence it set up educational labs and centers.[7] Funds from Title V were also used for developing accountability programs.

SPECS. The list of research and development projects undertaken under these three titles over the last decade is extensive. Several

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[7] Steven K. Bailey and Edith K. Mosher, ESEA: The Office of Education Administers a Law (Syracuse, NY. 1968), pp. 53-57.

of these projects have been "housed" at the Center for Educational Policy and Management (CEPM) at the University of Oregon. One of these is the SPECS (School Planning, Evaluation and Communication System) Project, a systems approach to operating a school district. Part of the research on the development and implementation of SPECS involves assessing the costs of installing that system in a school district. This paper details the results of that study.

I

EDUCATIONAL COST ANALYSES

Theodore Schultz' book, The Economic Value of Education[1], provides a framework for assessing the costs of schooling. Although one normally thinks of "costs" only in terms of the school budget, the answer to the question, "How much does schooling cost?" is actually much more complicated. In addition to the goods and services purchased, many hours of time are provided by students as well as by others in the community.

Economists define costs in terms of opportunities foregone. Using this concept, the value of a commodity is defined by the best alternative use of dollars it costs. For example, if school district personnel must choose between a swimming pool and a language laboratory, they forego one when selecting the other. In other words, in their decision to construct a swimming pool, they must pay the value of the language laboratory. This concept is called opportunity cost. (If there was no choice as to how the money would be spent the opportunity cost would be zero.)

Normally, opportunity cost is measured in dollars; sometimes, however, it is more convenient to use hours of time. (This is the calculation made by the student who can't decide whether to spend time studying or playing basketball.) Whether the opportunity costs are measured in dollars or in hours, the costs are most usefully conceived of in terms of opportunities foregone.

Categories of Costs

There are many kinds of opportunity costs. To begin with, a distinction

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[1]Theodore Schultz, The Economic Value of Education, (New York, N.Y. 1963).

should be made between private and social costs. Private costs are those which are borne by an individual or one's family, rather than the society as a whole. By contrast, social costs, which include private costs, are those which accrue to the entire society.[2]

The most sizable private contribution to public education involves student time and the foregone earnings represented by it. Schultz estimated that approximately 60% of the total (social) costs of schooling in high school and college were represented by earnings foregone.[3]

Even in elementary school, children's attendance at school means they cannot perform duties for the family such as babysitting. (Urban teachers are familiar with students who must stay at home to care for younger children while their parents work.)

There are also others to whom private costs accrue. School board members serving in the 15,000 local and state boards of education around the country come most readily to mind. Added to that are volunteers for numerous school activities and district committee participants. Although these individuals are not paid by the institutions they serve, their work, too, has an opportunity cost since their hours could be spent differently. In this case, however, the cost is paid by the individuals, rather than the institution.

Normally, the cost of time in school is expressed in terms of the average

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[2]For a discussion of private and social costs as well as direct and indirect costs and other aspects of educational costs in general, see J. Alan Thomas, The Productive School: A Systems Analysis Approach to Educational Administration (New York NY, 1971), pp. 31-55.

[3]Theodore W. Schultz, op. cit., pp. 28-30. Schultz' figures are from the mid 1950's. He also presents data from studies done in Mexico, Israel and Venezuela showing similar percentages for earnings foregone during these years.

number of dollars earned by comparable students who are in the labor force.[4] In the case of young children and adults, however, it is difficult to accurately estimate the value of time contributed. For this reason it is preferable to express the quantification in hourly units rather than to convert it to a dollar figure.

Both private and social costs of education may be divided into direct and indirect costs, but it is the social costs that normally are of interest. Direct costs are those which entail an actual expenditure of money; indirect costs do not involve actual dollar outlays but rather include such items as the value of student time, depreciation of buildings and equipment, imputed interest, and other quantifiable and nonquantifiable costs. Direct costs are normally encompassed in the district budget. Teachers, principals, clerical help, central office personnel--all must be paid to perform their services.

It is helpful to "break down" budgets into several cost areas. The line-item budget format does this, of course. However, the most useful categories for our purposes are those described by Emil J. Haller:[5]

(1) Costs measurable in dollar expenditures. (Direct costs) Haller uses four categories of expenditures: time, materials, space, and equipment. More are possible, of course, but this grouping is sufficient for most discussions of educational costs.

(2) Costs measurable in dollars, but without actual expenditures. Included here are the important shifts in time that sometimes occur. If the vice-principal

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[4]See, for example, W. Lee Hansen, Burton A. Weisbrod, and William J. Scanlon, "Schooling and Earnings of Low Achievers," American Economic Review. Vol. 1, No. 3 (Summer, 1970), pp. 405-418.

[5]Emil J. Haller, "Cost Analysis for Educational Program Evaluation," in Evaluation in Education, ed. by W. James Popham (Berkeley, CA, 1974), pp. 399-450.

takes on added responsibilities in the area of program support and evaluation, spending one-third time on them, the cost of program support and evaluation may properly be assessed at one-third of the salary and benefits. Yet the cost to the district is an opportunity cost (whatever the vice-principal did with that time before the new assignment was given is sacrificed) rather than an incremental expenditure.[6] Such considerations are not explicitly allocated by the school budget, even though the number of dollars spent for school personnel occupies a prominent place.

(3) Costs which are quantifiable, but not in dollars. In this category lie the opportunity costs associated with the school board and others who contribute hours, with time clearly a cost whose value cannot be represented in dollars. Declines in standardized test scores also fall into this category.

(4) Costs which are not quantifiable. Here lies perhaps the most neglected area of cost analysis. Many times an important cost occurs, particularly during educational innovations, when disorganization results and the normal rhythm of the school day is disrupted. To choose one example, enormous nonquantifiable costs have accompanied racial integration. The elusive nature of these costs in no way detracts from their reality, and analyses which neglect such costs misrepresent the situation.

The last three categories are more difficult to assess than the first. In the final case--that of nonquantifiable costs--some attempts should be made to describe the nature and intensity of the costs involved even though they cannot

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[6]Time usage is probably the most important category of costs in education. As one writer said, "For the allocation of resources within schools, money is an irrelevancy." James Lytle, "The Schools Cannot Be Managed the Way Industry Is," American School Board Journal, Vol. 163, No. 2 (February, 1976), p. 36.

be described with precision.

The Costs of Educational Innovations

So far this discussion has focused upon total costs. A related subject is incremental costs. As districts adopt new curricula, new budgeting systems and other new ways of doing things, an important consideration is the costs which will accrue. Cost estimates for educational innovations differ from the estimates for total educational costs in that their purpose is to find out how many more resources are required or the savings involved under the system once the innovation has been installed. In either case, the objective is to estimate the difference between costs to the institution before and after the innovation. Even consideration of the implementation of an innovation involves costs, since that time cannot be put to alternative uses. The time spent considering an innovation multiplies when several individuals, rather than one, are involved.

Investment and consumption costs. In implementing a schoolwide or a districtwide innovation, the additional time required becomes so great that usually some if it must be paid for by the district. Often additional personnel are needed to undertake the comprehensive planning involved and to coordinate the efforts of teachers. Supplies and equipment may be needed or additional floor space may be required. The costs of educational innovations can be categorized in several ways. First investment/consumption costs will be considered followed by a consideration of other costs described by Haller.

A perplexing aspect of cost analysis involves the partitioning of educational costs into investment and consumption categories. As Shultz points out, all

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[7]Theodore Schultz, op. cit., pp. 22 & 37.

human activities, including schooling, involve aspects of investment and consumption. We are not concerned here with the investment and consumption aspects of schooling as they relate to students, but rather with district costs including those which accrue to teachers.

Most school expenditures are consumption costs because they do not result in a savings to the district in future years. For example, expenditures for a science program or for athletics are not made in the expectation of future savings. These activities, then, are properly regarded as consumption expenditures by the districts.

Yet some district expenditures are properly regarded as investments. For example, capital expenditures as well as costs associated with developing new curricula or new accounting procedures are investment costs. In general, whenever anything new is developed, the cost associated with its development may be thought of as an investment cost.

Phase of installation. One way of thinking about investment costs is to conceptualize the implementation of an innovation as investment, and on-going operation as consumption. Gene H. Fisher describes the flow of research and development, implementation and on-going costs using the weapon system life-cycle cost profiles shown in Figure 1.[8] The separation of these cost categories permits more effective analysis of investment and consumption categories.

Cost analyses of implementing educational innovations show similarities to the weapon system life-cycle cost profiles. Experience has shown that costs escalate early in the implementation process but diminish thereafter.

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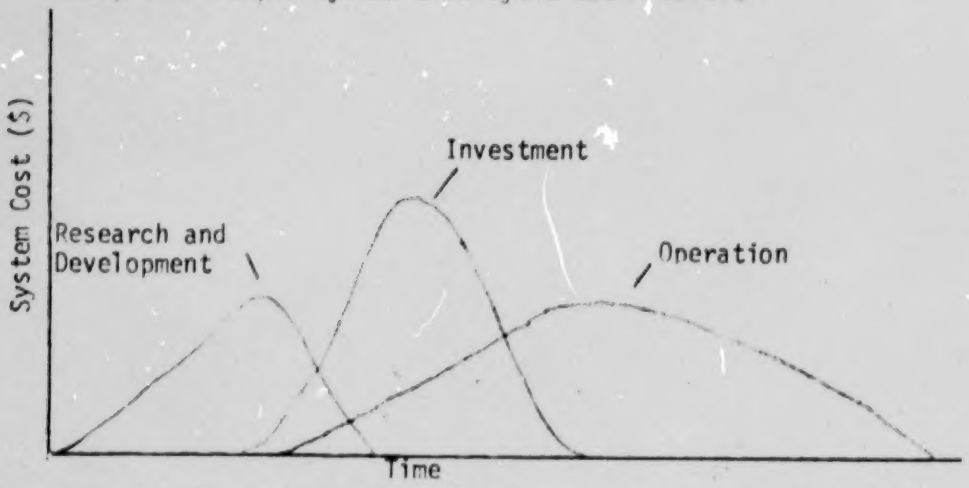
[8]Gene H. Fisher, Cost Considerations in Systems Analysis, (New York, NY, 1971), p. 67.

In education, a cost analysis based only on data derived early in the process of installing the innovation may overestimate the cost of the innovation. This is because the costs required to begin a project are usually greater

Figure 1

Example of Weapon System Life-Cycle Cost Profile*



*From Gene H. Fisher, Cost Considerations in Systems Analysis, (New York, NY, 1971), p.67.

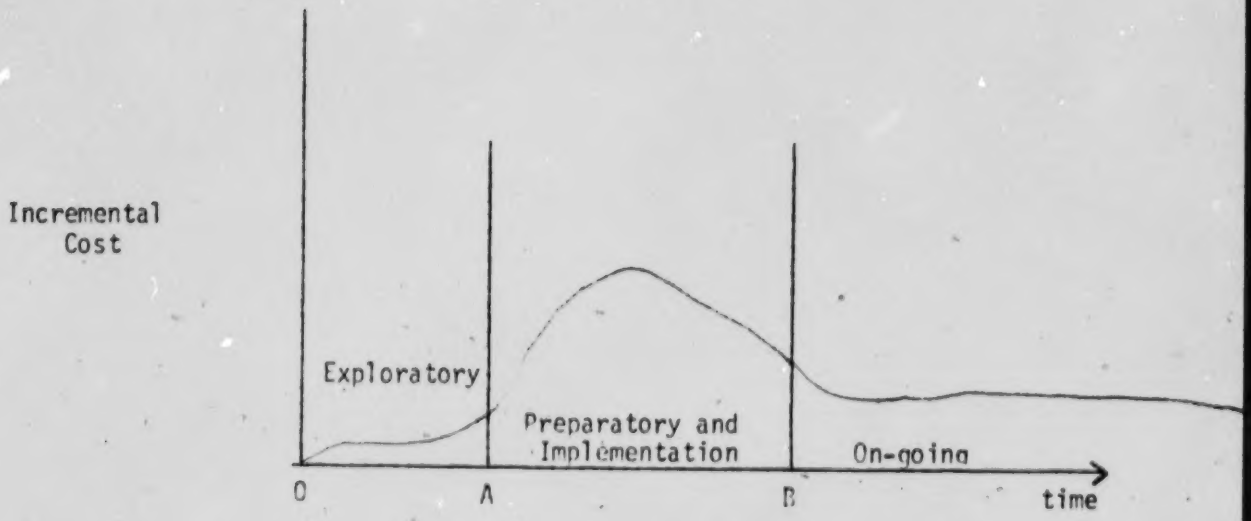
than those needed to sustain it once it has been implemented. Generally such costs are the result of the extra time needed to plan new ways of doing things. For example such an increment occurs in classroom innovations whenever a new unit is begun, particularly at the beginning of the year.

Figure 2 shows a hypothesized flow of costs during the implementation of an innovation. As shown, small amounts of resources are expended during the early, or exploratory phase (after the project has been accepted), while larger amounts of resources are required to plan and implement it.

Eventually the requirements gradually lessen and the incremental cost declines to a relatively stable level.

Figure 2

Hypothesized Total Cost Associated with Installing Educational Innovations



O= beginning of thought exploring feasibility of innovation

A= decision to go ahead with program

B= point at which implementation is completed

There is a great deal of interest in identifying those resources which will be required to implement a new project, particularly when the prospective users perceive that the costs may be prohibitive. More important, however, is the amount of time required to maintain the project. Each of these areas needs careful attention.

Incremental costs lie in all categories described by Haller. They are borne by taxpayers, teachers, parents, and students; they occur in the forms of salary, time inputs, supplies and equipment, and sometimes even additional space. Some incremental costs are quantifiable, either in terms of dollars or other measures, and some are not.

Unfortunately, the conceptual ease with which incremental costs may be outlined is not matched by the ease in assembling the data needed to describe such costs. Budgetary data are relatively easy to assemble, and determination of the cost of teacher time is not difficult. Even the assessment of the amount of time spent is sometimes easy, since logs may be kept of meetings, including data on who was in attendance and how long the meetings lasted. However, meetings and planning go on whether the innovation is being undertaken or not, and sorting out the particular parts which relate to the innovation from those which would occur in its absence involves much arbitrary judgement, and thus, is subject to a large measurement error.

Student achievement. Though generally thought of as a benefit, rather than as a cost, the basic question asked of an educational innovation usually concerns the innovation's effect on the student population. Usually, this involves measures of change in the ability of students to read and compute, using standardized, norm-referenced tests. The trend today towards criterion-referenced tests also involves estimates of student competence.

Unfortunately, an accurate assessment of even these small areas of student

achievement is difficult, and measures beyond the areas of reading and mathematics have not been refined sufficiently to permit researchers to compare the performance of two groups of children or to measure the change in one group's performance from one year to the next.[9] Even so, they represent an important potential cost and should not be ignored.

Problems in Assessing Costs of Innovations

The assessment of costs in various categories is not as simple as one might hope. As Garret Hardin so perceptively said, "You can never do merely one thing."[10] In an educational cost analysis, although one can observe the teacher, it is not simple to ascribe the teacher's actions to any single purpose. Normally the teacher is doing several things at one time: teaching, disciplining, planning for the next lesson, evaluating how well the present activity is proceeding, dealing with individual needs, and perhaps deciding when the best time to go to the teachers' room might be.

In this light, the cost analysis is fraught with problems; the activities are not mutually exclusive. Furthermore, assigning percentages of a teacher's effort to each of the activities would be done arbitrarily, and as a result, the costs determined by the analysis would be dependent upon those percentages. The implications of this are that the results of a cost analysis involving the time of personnel are suggestive at best.

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[9]The problems of evaluating reading and mathematics performance, and procedures for dealing with them, are discussed by G. Kasten Tallmadge and Donald D. Horst in their handbook, A Procedural Guide for Validating Achievement Gains in Educational Projects (Los Altos, CA, 1974). Evaluations of changes in the reading and mathematics competency of students should follow the design which they painstakingly lay out.

[10]Quoted in "Why Government Often Makes Matters Worse," Fortune, Vol. 89, No. 8, February, 1974, p.56.

A host of other problems face the cost analyst which are common to the educational researcher in general. Following is a brief summary of design problems.

Confounding problems. As an ancient philosopher observed, you can't step in the same stream twice. In education, the environment is constantly changing. Such change causes problems in estimating incremental costs, since the situation after implementation differs from the situation before implementation, not only because of the innovation but because of the many other influences on the institution over time. Sometimes the influences are small--a few new teachers, for example. Sometimes the changes are large, as when a district experiences a teacher strike accompanied by bitterness and disruption. Occasionally the influences are difficult to identify. For example, it would be impossible to estimate the effects of the recent economic recession on the morale of staff, separating declines resulting from employment uncertainty from those caused by difficulties encountered in bringing about constructive change.

Statistically, when two or more influences are brought to bear on a situation at the same time, it is impossible to separate the effects of either of them. This situation is universal in the quasi-experimental world of socially-related phenomena. While a cost analysis does not necessarily involve statistical estimation procedures, the problems are the same. In order to determine the effects of an innovation, one must separate them from all of the effects of all other influences; however, the problems are immense, and, strictly speaking, cannot be overcome.

Such confounding problems exist in determining time requirements, since variations exist which may be independent of the requirements imposed by the implementation.

Intensity of implementation. The thoroughness with which implementation is carried out will have substantial influence on its cost. The example which comes most readily to mind is individualized instruction: many efforts at compensatory education seek to address children's inadequacies in reading and mathematics by diagnosing and prescribing activities which are directly related to each child's needs. Often teachers provide children with individualized instruction in compensatory projects. There may be a math or reading room where a specialist works with children. Often the regular staff is supplemented by paraprofessional aides. Yet problems arise when one attempts to assess the costs of individualized instruction, since some classrooms will have two or three "individualized" groups, others six or seven and still others may have a "group" for every child. The time required to plan and evaluate in each classroom will vary substantially, and so will the number of aides needed. As a result, the cost is determined partly by the degree to which individualization is implemented.

Since the cost of the innovation is related to the intensity with which it is implemented, cost analyses should also assess the intensity involved.

Precision and underestimation. An often neglected area in cost analyses is the setting of limits. While budgeted expenditures are more easily ascertained than many other aspects of educational costs, precise determination is impossible. Two problems exist:

(1) Estimates given only in dollars may understate the actual cost of an implementation if they fail to include costs which accrue to staff, parents, students, and others. It is important to remember that these groups sometimes bear extra costs which are inordinately heavy during the innovation's implementation.

(2) When factors such as teacher time are considered, the cost cannot be measured precisely since accurate figures representing teacher time are usually prohibitively expensive to obtain. In addition, a large number of teachers is needed to provide narrow statistical confidence intervals, since wide variation exists in the time expended by teachers, both within and outside of the classroom.[11]

Where possible, parameters should be established for time factors, and the costs associated with them should be calculated. Whether a range of costs can be given or only a single cost figure can be provided, the meaning of the figures displayed should be clearly stated.

Experimental design. Estimating incremental costs involves choosing a situation "with" the innovation and comparing its costs to a situation "without" the innovation. There are two basic formats, each with its own problems.

(1) The experimental-control, cross-sectional design. Using this design costs are determined in each category of operating a school which is implementing the innovation (the experimental school) and a school not undergoing the innovation (the "control" school), and then comparing the two.

Presumably, many exogenous influences such as the general characteristics of students, the administrative structure, and district budgets and salary schedules are similar. Problems arise when between-school diferences are not controllable. For example, there are general differences among schools in the

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[11] Eaton H. Conant, Teacher and Paraprofessional Work Productivity, (Lexington, MA, 1974). In his study, Conant found (p. 6.33) that total actual instruction by teachers in 20 classrooms varied from 49 minutes per day to two hours and 22 minutes per day, a range of nearly 4:1.

morale and capabilities of teachers and principals. Secondly, student bodies are different in respect to ethnicity, socioeconomic status, population mobility, and size. If these characteristics cannot be equated, the cross-sectional design is of little use.

(2) The pre-post design. One school may be studied in isolation to determine costs in all categories. Using this design costs are measured before and after implementation and conclusions drawn from the differences which are observed. Teacher and principal characteristics, school size, and even student characteristics usually remain relatively stable, thus eliminating the problem of matching which occurs in the cross-sectional design. Although cost changes arising from budgetary shifts may be corrected for, this is sometimes difficult in non-dollar areas.

Two important problems exist with the pre-post design. First, innovations are rarely undertaken in isolation; normally, several innovative activities take place concurrently. Therefore, confounding problems exist. In addition, influences such as recessions and teacher strikes often result in creating problems when using this design.

Another problem concerns the examination of a situation before an innovation is being implemented. If, in fact, the analysis of variables such as teacher time expenditure does not begin until after teachers begin work, it is difficult to compare pre- and post-implementation activities.

Generally speaking, the pre-post design may be preferable because of the difficulties in matching schools. However, when conducting the cost analysis, both alternatives should be examined, since the cross-sectional design may be more suitable for some categories of expenditures.

Analytic Framework

Given the design problems discussed above, it was recognized that an assessment of costs could only be an approximation. However, it was also recognized that such an approximation must be as comprehensive as possible in order to capture the full range of potential costs and that it should embrace all costs reasonably assignable to implementing the innovation. To assemble data which depicted an accurate approximation, it was decided that these costs should reflect:

(1) An assessment directed primarily at the school district, but including, where possible, other parties who might also incur costs.

(2) All phases of the innovation.

(3) All costs quantifiable in dollars, whether or not actual expenditures are involved. Some effort whould be made to include costs which are not quantifiable or which are quantifiable, but not in dollar amounts.

These considerations were used to define three categories of costs for which data would be accumulated. These categories included: (1) persons bearing costs, (2) phases of implementation, and (3) forms of cost definition. In turn, these categories were further subdivided into other cost dimensions. These categories, together with their cost dimensions, included:

(1) Categories of persons bearing costs

a. Taxpayers
b. Teachers
c. Administrators
d. Students
e. Parents

(2) Phases of innovation implementation

a. Exploratory costs
b. Preparatory costs
c. Implementation costs
d. On-going operational costs

(3) Forms of cost definition

a. Quantifiable in dollars and involving actual expenditures
b. Quantifiable in dollars and not involving actual expenditures
c. Quantifiable costs not involving dollars
d. Nonquantifiable costs

In addition to listing costs according to these categories it was recognized that three matrices could show, for instance, costs to teachers for exploratory, preparatory, implementation, and on-going activities. It was discovered, however, that in many cases, the cost information necessary to complete such an analysis was simply not available. Furthermore, the utility of providing such information was questionable since some cells the matrices would be inapplicable in a practical sense. For example, in the case of a matrix showing categories of persons bearing costs on one axis and the phases of innovation implementation on the other, the cell representing exploratory costs to students, while theoretically possible, was not a real cost item.

It was decided that cost information would be collected and categorized in accordance with the categories as described above. It was decided, also, that a comprehensive matrix analysis would not be undertaken, but that relationships between categories, where data were available, would be shown.

It is this framework that was applied to the specific innovation under consideration, SPECS. Chapter II will assess costs to the districts and Chapter III will estimate costs to teachers and administrators, with some

attention devoted to students, parents and citizens. Chapter IV will present information about costs of other PPBS implementation efforts. The information presented in the first four chapters will be integrated in the Summary, presented in Chapter V.

II

COSTS OF SPECS TO SCHOOL DISTRICTS

The history of SPECS (School Planning, Evaluation and Communication System) began in June, 1969, when Terry L. Eidell and John M. Nagle, the project leaders, "attempted to conceptualize a data-based program planning and evaluation system for public schools."[1] This system consisted of five components of activity:[2]

Component One. Component One has two primary purposes. First, it provides a descriptive analysis of the district's on-going activities. Second, it provides a structure for collecting budgetary and cost information and a structure for amassing output from each activity.

Component Two. Component Two is the budgeting and cost accounting component, which conforms closely to the structure and intent of the U.S. Office of Education Handbook Two Revised.[3] It provides a mechanism for building budgets and collecting cost data in a program format rather than in the typical line item format.

Component Three. This component, together with the first two components, comprises the operating subsystem of SPECS. Program planning-implementation-documentation-evaluation-and replanning is the central

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[1]John M. Nagle and Harold E. Walker, SPECS: What It is & What It Does (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1975), p. 1.

[2]Lloyd A. DuVall, Integrating School Performance and Community Expectations: A Model (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1975), pp. 9-20.

[3]Charles T. Roberts and Allan R. Lichtenberger, Financial Accounting: Classifications and Standard Terminology for Local and State School Systems (Washington, D.C.: U.S. Government Printing Office, 1973).

purpose of Component Three. This purpose, in a real sense, is the heart of SPECS. As a result of the planning to replanning cycle, communication is increased among district personnel. Thus, a second purpose is to build or strengthen existing avenues of communication between the many facets of district operation.

Component Four. Broad goal definition by the community is the primary purpose of Component Four. This component is referred to as the monitoring subsystem of SPECS. Through Component Four, the district can ascertain the "what is preferred" status of district operations.

Component Five. Component Five is the policy-making subsystem of SPECS. It is in this component that the data from the other two subsystems are brought together for policy-making purposes. When data concerning costs and expenditures, program achievements, and citizen expectations are analyzed, information is provided which can directly affect the district's policy directions. In essence, this component is the needs assessment capacity of SPECS. By comparing outcomes with expectations, discrepancies can be identified which define the needs to which policy-makers must give attention.

Each of these components is designed to be used separately or together with the other four components as a complete system. There is no prescribed order in which they must occur and none has more intrinsic worth than the other. For example, while some districts begin by implementing Component Three, others are interested only in Component Two. Since no field test district has implemented all five components at the time of this writing, estimates of the costs of implementing the total system are difficult to make.

For each of the five components, costs expended include direct, out-of-pocket costs such as the purchase of additional services (inservice workshops, consultant time and computer assistance) as well as costs for materials. However, indirect or hidden costs which are less amenable to quantification also exist. Several examples of hidden costs include changes in the way in which staff members spend their time, morale or attitude changes in both students and staff, and changes in student performance.

The purpose of this study is to estimate the additional dollars required to implement SPECS as well as to determine the additional time exacted from administrators and teachers. (Another study assesses the attitudes and perceptions of those who have been involved with the SPECS field test.)[4] In this paper, activities involved at different stages of SPECS installation have been divided into "exploratory," "preparatory," "implementation" and "ongoing" phases. Direct and indirect costs will be estimated for each of these four categories.

Ideally, costs would be assessed for each of the five components of SPECS in each phase of implementation. However, since exploratory and preparatory phase activities are not readily disaggregated into components, these costs will be estimated only for the program as a whole. Furthermore, because some components have not been fully implemented in all of the elementary and secondary schools in the field test districts, estimates must sometimes be made with little supporting data.

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[4]Sundra Gregory, "Teacher and Administrator Attitudes About SPECS" (Tentative title); (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976).

The pilot and field tests. The pilot test of SPECS in one district began in 1970. All teachers and administrators in the district were involved, community goals were developed, and a program budget and program cost accounting system was implemented. The district took a total district approach to implementing all five components of the SPECS system.

During this pilot test, Development Team members worked directly with teachers and administrators. Data were collected which were used to modify materials and procedures. Information was passed directly between the users and the developers, and, as a result, not only the school district was affected, but also the structure of SPECS itself.

After the conclusion of the pilot test in 1973, the SPECS Development Team turned to a larger field test. Thirteen districts, located in seven states, took part in this field testing phase. This phase differed from the pilot test in that Development Team members were not as intimately involved with implementation as they had been in the pilot phase. Also, data were no longer being sought for the purpose of refining materials. Instead, the focus was upon testing various implementation strategies, inservice training approaches, and a pattern of dissemination involving local consultants.

Obtaining cost estimates. This study presents estimates of how much districts actually spent or how much they planned to spend to implement SPECS. However, it becomes very difficult to assess each district's return for its money and time expended. Although one might argue that an incremental expenditure of zero dollars is likely to result in zero change, some districts apparently made substantial progress in implementing SPECS with minimal expenditures. Conversely, some appear to have made little progress despite substantial financial investment.

Several sources of data were utilized in this study. The primary source was the records of SPECS field test site activities which were maintained by the SPECS Development Team at the Center for Educational Policy and Management. These records included instructional materials used by the sites; memoranda regarding conversations between Development Team members, consultants and site personnel; records of meetings; and other materials. Near the conclusion of the field test, these records were used to compile a set of SPECS event chronologies for the districts which had been involved in the program. These sources were supplemented by personal conversations with field test site personnel as well as with personnel from the SPECS pilot site.

Costs are expressed as dollar estimates and as person-hours of time. When staff time was compensated by the district in terms of dollars, the time expenditures have been listed as direct costs to the district. In the case of meetings and other time-consuming activities for which personnel received no monetary compensation, costs have been expressed in terms of person-hours.

An average teacher's salary has been estimated at $13,000 per school year for 1975-76. This figure, when divided by 185 (the approximate number of contract days per year) and then by 7 (the approximate number of hours worked per day) yields an hourly rate of $10.03. This salary was then incremented by indirect salary costs to the district. Although fringe benefit levels vary widely, a figure of 14% was used to represent fringe benefits, resulting in a rate of $11.44 per hour.

Finally, it is important to remember that this analysis is only partial rather than complete. Although thirteen districts participated

in the SPECS field test, only those districts for which cost data were available will be discussed. In addition, only brief attention will be given to assessing costs to students and parents, and to deciding the importance of nonquantifiable costs. In addition, little information was available regarding the cost of implementing Component Five, the component in which "what is" is compared to "what should be."

Exploratory Phase

The SPECS exploratory phase is described as beginning "with a request for information about SPECS" and concluding "with a decision to engage in a series of 'next steps' designed to prepare, but not commit, a school district for implementation of all or part of the system."[5]

The field test districts' exploratory phase activities seldom were logged; only after preparatory activities had begun, were systematic records maintained. Therefore, it is difficult to assess the costs of exploratory activities; nevertheless, some generalizations can be made.

(1) All, or nearly all, of the districts became interested in SPECS when a district administrator participated in a workshop on SPECS or took a course dealing with PPBS. For these districts, out-of-pocket expenses may have been incurred for the attendance of personnel at the workshops. However, inasmuch as the budget normally contains provision for such activities, there was no direct incremental cost.

(2) In most districts, a few administrative personnel recommended to the board that the district enter the preparatory phase. Out-of-pocket costs to the district appear to be zero and the number of hours involved was generally modest.

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[5]John M. Nagle and Harold E. Walker, op. cit., p. 24.

River Park. River Park School District served as the pilot test district for implementation of SPECS.[6] As explained earlier, the pilot district's experiences were unique. The district entered the implementation phase after the Superintendent attended a workshop at the University of Oregon in the summer of 1970. In the fall, the Superintendent presented to the staff his decision to implement SPECS on the first inservice day of the academic year as a fait accompli.[7] While much thought undoubtedly preceded this decision, there is no evidence of any cost associated with this phase.

Anthony. As in other school districts, personnel in Anthony Public Schools were introduced to SPECS via an orientation meeting in the spring. After the meeting was held, personnel in one department in the high school voted to implement SPECS in their program. Costs for the exploratory phase were, therefore, negligible.

Duniway. After engaging in exploratory activities, personnel in Duniway School District decided not to implement SPECS. The costs of exploring SPECS in Duniway were incurred primarily in hours of time contributed to the effort. As shown in Table 1, the Duniway staff spent approximately 390 hours in formal SPECS exploratory activities, although informal meetings and discussions may also have occurred.

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[6]All districts discussed in this report have been referred to by fictitious names.

[7]Paul Goldman and Sundra Gregory, "PPBS and Teachers: Responses to an Educational Innovation" (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1975), p. 8.

Table 1

Hours Spent in Exploratory Activities
by Personnel in Duniway*

Initial meeting, 6 people, 1 hr.	6 hours
Orientation workshop, 14 people, 6 hrs.	84
Attendance at Fall Conference (3 days for 4 people)	84
One-day workshop for 22 principals, 6 hrs.	132
Attendance at Spring Conference (3 days for 4 people)	84
Total	390 hours

*Barbara Cole and Stephanie S. Henderson, "Duniway Public Schools" SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976); and information on file.

Two Crossings. In Two Crossings Public Schools, exploratory activities included several meetings between district personnel, particularly the Superintendent, the SPECS Consultant and/or one or more Development Team members. Approximately 20-40 hours of staff time were involved. The district also held a three-day workshop during the summer, which was paid for by the district. Although this workshop may have been an exploratory activity, the author has allocated the costs to the preparatory phase since the tasks more closely correspond to those prescribed for the later phase.

Summary of exploratory phase costs. Direct costs associated with the exploratory phase seem to be incidental. Because of a lack of systematic records during

this phase, it is difficult to estimate the number of hours actually spent. SPECS records indicate that Two Crossing's 20-40 hours and Duniway's 390 hours represent a range in which most districts could conclude exploratory activities.

Preparatory Phase

The preparatory phase involved a commitment by district personnel to study the SPECS system in detail and plan implementation strategies. This phase included the workshops held for district personnel for the purpose of introducing SPECS procedures, materials, and terminology. In addition, the preparatory phase also included the preparation of a district's Master Plan for implementation.[8]

River Park. River Park personnel engaged in extensive preparatory activities. Twenty-five of the district's 185 certified personnel attended an extensive series of workshops led by University of Oregon personnel. This group, which had previously operated as the district's curriculum committee, became the SPECS steering committee. The 1970-1971 school year culminated with teachers planning a single instructional unit according to the SPECS format and using it in their classrooms.[9]

Records of the River Park pilot study are incomplete, and the [State][10] Board of Education Task Force study does not separate costs according to

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[8]John M. Nagle and Harold E. Walker, op. cit., pp. 25-26.

[9]Goldman and Gregory, op. cit.,

[10] Although this was an actual study done by the Board of Education, the name of thestate has been removed to insure the district's anonymity.

"preparatory" and "implementation," but instead lumps them together as "developmental costs." (Their figures for the entire River Park operation are given in Appendix A.) If one assumes that the first year's activities were "preparatory" and the second were "implementation," the district expended approximately $7,000 on preparatory activities, mainly for substitutes and for workshops. In addition, much of the Curriculum Leader's time was spent on SPECS development, and Program Planning Leaders also spent some time on SPECS.

Anthony. In Anthony a workshop was held in November to learn more about SPECS and to prepare for implementation. Twenty-one persons including the Superintendent, building administrators and teachers attended the two-day workshop. The Vocational Education Department voted to begin implementation in the fall. In Anthony, no formal task force was organized, and the proposal for state department funds functioned as a Master Plan.

Mott. Mott engaged in preparatory activities from April to October 1974, ending with the Board's decision to adopt SPECS. Preparation began in earnest over the summer, with establishment of a committee to draw up the Master Plan, a visit by two district leaders to the University of Oregon during the summer, and other meetings intermittently. The district budgeted $2,500 for this phase of activity. In addition, the Curriculum Director devoted much of his time to the SPECS preparatory phase, and over 100 hours were spent by other personnel. An estimate of contributed costs is presented in Table 2.

Table 2

Estimated Direct and Indirect Costs of Preparatory Activities in Mott*

Direct costs	$2,000	
Contributed time		
Curriculum Director (5/12 of 1 year's time)	642 hours	
Other meetings, etc.	131 hours	773 hours

*Barbara Cole and Stephanie S. Anderson, "Mott Public Schools," SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976); and information on file.

Stanton. Stanton was one of the first districts to consider SPECS implementation at the beginning of the field test. Little information is available about Stanton's exploratory activities, or about the amount of money budgeted for preparatory activities, although $2,500 was earmarked for assistance by the General Learning Corporation. This sum included funds allocated for the services of Development Team member Hal Walker as well as funds for preparation of the Master Plan. In addition, $2,217 was spent for workshops and other inservice.[11] Activities carried on in Stanton included one and one-half days of workshop for principals and the thirty-member SPECS Advisory Council in January, and two half-day workshops for the Advisory Council.

[11]Conversations, Curriculum Director, Stanton Public Schools, April 8 and 10, 1976.

In addition to these activities which involved direct costs, a number of meetings took place for which the participants were not compensated. The figures presented in Table 3, taken from the Stanton event record, are estimates of the time involved. According to the SPECS records, about 96 hours of staff time were expended in meetings concerning SPECS during this phase. In addition, 596 hours were expended in workshops for which the participants were monetarily compensated.

Table 3

Estimated Costs of Preparatory Activities in Stanton*

Direct costs	
596 hours for workshops	$2,217
Payment for Master Plan development	2,500
	$4,717
Person hours for which no compensation was paid	96 hours

*Barbara Cole and Stephanie S. Henderson, "Stanton Public Schools," SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976); information on file; and conversations with district personnel.

Two Crossings. Two Crossings' preparatory activities included drawing up an eight- to ten-page Master Plan which underwent at least two revisions, regular meetings of a task force on implementation, a three-day workshop, and inservice meetings for district teachers.

Estimates of Two Crossings' direct costs and time expended are detailed in Table 4. These estimates do not include the time expended by Board members in evaluating the system. Furthermore, estimates of time required for meetings include only those discussed in the event records, although additional meetings may have been held which were unrecorded.

Estimates show that appriximately 323 hours of staff time were required for preparatory activities, in addition to approximately $2,860 in dollar outlays. This latter cost includes $360 for six teachers and administrators to attend a three-day summer workshop. The figure used in making this estimate was $20 per day, (the substitute teacher rate in Two Crossings) which was the rate at which teachers were compensated for attending inservice sessions.

In addition, Development Team members recommended that additional inservice be provided for those staff members who would be using SPECS.[12]

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[12]Barbara Cole and Stephanie S. Henderson, "Two Crossings Public Schools," Appendix A. SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976).

Table 4

Estimated Direct Costs and Time Required for Preparatory Activities in Two Crossings During 1974-1975

Activity	Estimated Person Hours
Workshop	147 hours
Master Plan prep	70 hours
Misc. meetings	44 hours
Task Force	62 hours
	323 hours
Direct costs:	
Consultant	$ 500
Other costs, primarily for 8 half-day inservice day meetings and substitutes	2,000
Summer workshop, 3 days for 6 persons for whom subs. were hired at $20/day	360
	$2,860

Summary of preparatory phase costs. Table 5 shows that dollar expenditures ranged from $0 to $7,000, while time estimates ranged from 0 to 773 person hours spent in preparatory phase activities. It must be remembered that these estimates are for activities referred to in

the SPECS records, and that the districts' activities were not comparable, since the districts varied in size from 350 to 9,500 students. In addition to inherent differences between the districts, districts also adopted different implementation strategies. For example, River Park and Anthony, unlike the other districts, had no formal Master Plan. Too, the nature of the task forces in River Park and Two Crossings differed from those found in the other field test sites.

Table 5

Estimated Direct Costs and Person-Hours Expended for Preparatory Activities in Five Districts

District	Enrollment	Estimated Direct Costs	Estimated Person-Hours Expended
River Park	3,500	7,000	?
Mott	9,500	2,500	773
Stanton	5,800	4,717	96
Two Crossings	350	2,860	325
Anthony	4,400	0	?

Perhaps the best way to describe hourly expenditures is to divide them into two classes: those required at the central office level, where the Master Plan was drawn up and implementation was mapped out, and those expended by teachers in evaluating the system and making go/no-go decisions on Component Three. If we accept this division, we might

estimate that between fifteen and one hundred hours were required for central office personnel to write the Master Plan, in addition to the hours spent by teachers in the preparatory phase.

Implementation Phase

This inspection of the costs of installing SPECS in school districts may be viewed in terms of the five SPECS components. The reader is reminded that data on implementation are scarce and only River Park has touched upon all five components of SPECS. Mott is the only other district in which Component Three has spread beyond one school, and in most districts, Component Three implementation has been confined to only one subject. Given these conditions, only a tentative answer is available to the question of costs.

River Park. Although Component One was implemented in River Park, little systematic data are available concerning costs of implementation. Therefore, this discussion will begin with a focus on Component Two.

River Park was the first district in the state to shift to the program budget format. Consequently, the district's implementation costs were probably greater than would be experienced by districts today.

The estimates made by the [State] Board of Education Task Force on costs for River Park are given in Table 6. The services attributed to the University of Oregon are estimates of the value of time contributed; the amounts attributed to the Board of Education represent actual dollars expended. These figures do not include the computer facility's contribution of computer time, since the facility utilized the River Park experience as a pilot test for a program budget system which could later be used to service other districts in the state.

Table 6

Costs of Developing Component Two
in River Park*

Data Program Coordinator's salary, 1972-73 and 1973-74	$10,000
Fees paid by U of O for development of computer programming	10,000
Fees paid by Board of Education for system development	2,500
	$ 23,500

*From [State]Board of Education Task Force, 1974.

For Component Three in River Park, the [State] Board of Education Task Force reported that $6,500 per year was expended for two years for extended contracts, including summer workshops. In addition, $10,000 per year was allocated for a Curriculum Development Coordinator. Added to these direct expenses, were substantial time costs. Classes were dismissed one afternoon per week while staff members engaged in implementation activities. In addition, twenty-five Program Planning Leaders were allocated four hours of released time per week for SPECS-related activities. And, finally, six days' inservice was initiated each year for all staff to plan, evaluate, and summarize their SPECS activities. These costs are listed in Table 7, which show that over 28,000 hours was expended by personnel each year for implementing SPECS. Costs may also be represented as 132 hours per staff person per year, plus summer workshops and a coordinator's time.

Table 7

Estimated Direct Costs and Person-Hours Expended for Component Three Implementation in River Park[a]

Direct costs	
Extended contracts	$ 6,500 per year for two years
Curriculum Development Coordinator	10,000 " " " " "
	$16,500 " " " " "
Person-hours	
All staff - 2 1/2 hours per week (185 staff x 2 1/2 hours x 36 weeks)[b]	16,650 hrs (90 per teacher)
All staff - 6 days planning (185 staff x 7 hours x 6 days)	7,770 hrs (42 per teacher)
Program Planning Leaders (25 staff x 4 hours x 37 weeks)	3,700
	28,120 hours per year

[a]Paul Goldman and Sundra Gregory, "PPBS and Teachers: Responses to an Educational Innovation," (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1975); and [State] Board of Education Task Force, 1974.

[b]Although the usual number of weeks in a school year is 37, one less was used because of time missed during a holiday.

Component Four calls for establishing community-based educational goals. In River Park, a Citizen's Advisory Committee was established to define such goals. Community input was acquired through a newspaper

questionnaire and through community meetings. Upon completion of this task the committee communicated its findings to the School Board.

Direct costs for implementing Component Four in River Park were not presented in the task force report. They were limited to costs for the newspaper questionnaire, and even this cost may have been contributed by the publisher. The hours of staff time expended were negligible.

As indicated earlier, Component Five has not been implemented by any field test district. In the pilot site, River Park, summaries were prepared of all programs, but some district personnel had not received the necessary training to enable them to use this evaluative data in a systematic way. Little information is available regarding the costs of these activities.

Anthony. Following an introductory workshop in Anthony, members of the vocational education department of Anthony High School made the decision to implement Component Three. The teachers in that department wrote a proposal to obtain $18,000 for implementation. This included funds for materials, consultants, one full-time secretary and two administrators spending up to two weeks at the University of Oregon. Also included were costs for 100 hours of inservice workshops for each of nine teachers. At the end of three years of implementation, each teacher was to receive about 350 hours of inservice. [13] The state awarded $7,600 to the district, most of which was spent for teacher workshops.[14]

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[13]Barbara Cole and Stephanie S. Henderson, "Anthony Public Schools," SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976), reference to February 6, 1975.

[14]Ibid., April 7, 1975.

Workshops to orient staff members were held in Septmeber. In addition to these workshops, the staff met for one hour per month to share their experiences.

The cost of implementing SPECS in Anthony High School's Vocational Education Department was approximately $7,600 for one year, or less than $850 per teacher.

Bethune River. Development Team member Hal Walker told the systems analyst from Bethune River that completion of Component One should take "about three weeks."[15] Assuming that one person devoted full time to this task approximately 100-150 hours of staff time would be required for completion of Component One in that district.

Implementation of Component Three in Bethune River differed in several ways from implementation in other districts. First, the district received $40,000 to work on an assessment and/or accountability program. Secondly, rather than use a large portion of funds for teacher workshops, personnel in Bethune River elected instead to hire three additional staff members--an Evaluation and Planning Director, a systems analyst, and a secretary. The efforts of the Evaluation and Planning Director were directed mainly toward development of a model of accountability in the affective domain.

Teacher participation in the project was encouraged by offering teachers $30 or four units of credit to take a PPBS class at a state university. In total, the district received $40,000 to implement SPECS.

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[15]Report by Hal Walker, Bethune River file, January 28, 1975.

Bethune River, like several other field test districts, implemented Component Four using the Phi Delta Kappa procedures. (Generally this program involves setting priorities around a pre-defined set of goal statements in different areas.) Goals and philosophy were developed for the middle school and adopted by the Board in April. Involved were 18 goals, each comprised of several subgoals.

Resource requirements were evidently relatively modest. Perhaps 50-75 hours were required. Dollar outlays likewise appear to be incidental, limited to paper for printing.

Gilman. IN Gilman, interest in SPECS grew at the same time that Early Childhood funds, a state categorical aid program, became available. Five teachers who were involved in teaching at the K-3 level decided to implement Component Three in the mathematics curriculum.

The budget for one year of implementation in Gilman is presented in Table 8. It should be stressed that this expenditure is for five teachers to teach one subject only. Using the minimum figure of $7,410, this amounts to $1,482 per teacher. However, the level of funding described in Table 8 was not realized and the teachers eventually contributed additional hours of their own time.

Table 8

Anticipated Costs of Implementing Component Three in Gilman*

	Minimum	Maximum
Five teachers summer work @ $35 an hour for 60-80 hours	$2,100	$2,800
Six hour instructional aide (.375 FTE allocation)	4,000	4,000
Substitutes for released time 8-10 times for five teachers (rate 1/2 day = $95)	760	950
SPECS consultant - 2 or 3 times during the year @ $150 for each day	300	450
SPECS materials	50	90
SPECS conference expenses for two meetings during the year. For 2 to 4 people from building (Approximately $100 per person)	200	400
Calls to SPECS Development Team	0	0
Visits from SPECS Development Team	0	0
	$7,410	to $8,690

* Barbara Cole and Stephanie S. Henderson, "Gilman Public Schools," SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976), p. 16.

Mott. In Mott, with the exception of one teacher, all teachers in two elementary schools implemented Component Three in their math programs and several implemented it in other subjects as well.

Four general costs were incurred in Mott for Component Three implementation:

(1) The Director of Curriculum who was also responsible for personnel changed to the position of a full-time Curriculum Director, while another person was assigned to manage personnel. Therefore, one cost was one-half the salary of the Curriculum Director. However, this shift involved no additional direct costs.

(2) Approximately $2,281 was spent in direct additional expenses during the first year of implementation, including funds for substitute teachers during inservice training ($760.00), for materials ($346.47), for travel to SPECS conferences ($546.57), and for consultants ($627.66).[16]

(3) The third general cost involved future costs to the district. Most of the teachers were encouraged to enroll in a course from the SPECS consultant at the state university for which they received units of credit. Eventually these units may transfer into additional costs in the salary schedule.

(4) Finally, the Curriculum Director spent much time in orientation and meetings with staff members.

Excluding the efforts of the Curriculum Director, an estimated 741 hours were spent in meetings for which no additional compensation was rendered since these meetings were held during the regular school day. In addition, the Curriculum Director met with the faculties of all elementary schools in Mott. On one day students were excused from school one-half hour early. The staffs of these schools (again excluding the Curriculum

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[16]Interview, Curriculum Director, Mott Public Schools, May, 1975.

Director) spent an estimated 518 hours being introduced to SPECS. Nineteen staff members were involved, which translates to 38 1/2 hours per staff member in attending meetings.

A summary of estimated costs for one year of implementation in Mott is given in Table 9.

Table 9

Estimated Costs of Implementing SPECS in Mott*

Direct costs	
Workshops, materials, travel, consultants	$ 2,281
Curriculum Director (1/2 salary for 3/4 year)	10,500
	$12,781
Indirect costs	
Meetings, SPECS schools	741 hours
Introductions to other schools	581 hours
	1,259 hours

*Barbara Cole and Stephanie S. Henderson, "Mott Public Schools," SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976); information on file; and interviews with district personnel.

Stanton. Stanton implemented a program budget after the district had formally withdrawn from the SPECS field test project. This task was accomplished, however, using a somewhat modified approach to Component Two of SPECS. The Curriculum Director was asked to estimate the district's costs for implementing the program budget. He estimated that cost at $6,140, not including staff time.[17]

No figures are available on hours of time contributed by district personnel. However the dollar figure for Stanton, a district of 5,800 students, may be an accurate estimate of costs which would be incurred by a similar district today, although it does not include staff time contributed to the work.

It should be noted that the Component Two work in Stanton was based on the previous Component Two work in River Park. The diffenence in cost between $25,000 for River Park and $6,140 for Stanton is an example of the dramatic cost reduction which subsequent users can expect following initial development.

In a letter to the Curriculum Director of the Stanton Public Schools, Lloyd DuVall, who was then employed as a consultant by General Learning Corporation, indicated that a budget of $10,000 to $15,000 should be sufficient to continue work on integrating Component Two into the total operations of the district, begin implementation of Component Three and complete 'detailed plans' for Component Four.[18]

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[17]Interview, Curriculum Director, Stanton Public Schools, April 8 and 10, 1976.

[18]Lloyd DuVall, Stanton event file, November 27, 1973.

Tubman. In Tubman, plans called for implementation of Component Three in one subject in one elementary school. It is difficult to assess the costs by components in Tubman since the funds which were initially allocated for SPECS included work in Components Two, Three, and Four.

Table 10 gives figures for direct costs and estimated hours of time expended according to the district's event chronology. Most notable were 279 hours of time spent by staff members, and $10,000 for consultants. Since there were 28 teachers in the district, this 279 hours translates into an average of ten hours per teacher. Because implementation was discontinued in the middle of the school year, the number of hours probably would have been larger had implementation continued throughout the year.

Table 10

Estimated Costs of Implementing SPECS in Tubman*

Estimated budget for year (from Title V grant application)	
Salaries, staff	$ 5,500
Consultants	10,000
Printing	500
Component Three materials	750
Component Two materials	450
	$ 17,200
Hours expended in meetings, site visits, etc.	279 hours

*Barbara Cole and Stephanie S. Henderson, "Tubman Public Schools," SPECS Event Chronologies (Eugene, OR: Center for Educational Policy and Management, University of Oregon, 1976); and information on file.

Summary of implementation costs. Generally, most districts spent little time on Component One activities. There are, moreover, no records of any direct expenses which can readily be attributed to Component One.

In Component Two, costs of providing schooling are reorganized according to the "program budget" format. The incremental costs associated with Component Two implementation depend somewhat on whether or not a district has already installed a computerized system. Needless to say, the costs of operating a computer system can vary dramatically. In addition to pilot site, River Park, only one field test district implemented the component.

As with Component Two, conclusions about the costs of implementing Component Three must remain tentative. Pilot site River Park's direct costs were modest--$16,500 per year for two years--but staff members each spent about 132 hours per year for two years. It seems that these costs might be taken to be an "upper limit" on costs.

On the other hand in Anthony, a commitment of $7,600 was sufficient for nine vocational education teachers to implement Component Three. Such a modest investment would not, however, be sufficient to implement Component Three throughout the district. Table 11 shows a summary of direct costs and time expended for implementation in River Park and five field test sites.

Table 11

Summary of Direct Costs and Time Expended for the Implementation of Component Three

District	Direct Costs (Dollar Outlays)	Minimum Total Time Documented	Minimum Average Per Teacher
River Park	$33,000	23,120 hours	132 hours
Mott	12,781	1,259 hours	38 hours
Tubman	17,200	279 hours	10 hours
Bethune River	40,000	undocumented	
Anthony	7,600	undocumented	
Gilman	7,410	undocumented	

Although few districts had implemented Component Four, it seems reasonable to conclude that the costs for implementing Component Four, at least in a small district, are inconsequential.

It appears to the author that costs for implementing Component Five would lie primarily in the area of staff time. How much, however, cannot be discerned until researchers learn more about what it is reasonable to expect of students. This problem includes development and testing of better psychometric tools.

The On-going Operation

In Chapter I it was hypothesized that implementing an educational innovation would be more expensive than maintaining it. This research

is, nevertheless, incapable of testing the hypothesis for only one district has passed into this phase.

River Park's system has been in operation for five years now, although all programs have not been converted to the format suggested in Component Three: Instructional Program Planning, Evaluation and Communication. The State Board of Education Task Force estimated that the costs for continued operation of SPECS would be approximately $44,860 per year in this district of 3,500 students, plus $5,000 for inservice workshops to develop curriculum. These direct expenditures do not include the cost of extra planning, evaluation and record keeping. These costs are presented in Table 12.

Table 12

On-going Annual Operating Costs for River Park*

Inservice for additional curriculum development (1974-75)	$ 5,000
Curriculum development cost above that normally expended	11,000
Project coordinator's salary	10,000
Substitutes for Program Planning Leaders	1,000
Program Planning Leader's salaries for six to ten persons, 3 hrs. per week	22,860
	$49,860

*From [State] Board of Education Task Force, 1974.

River Park's Superintendent stated that it is difficult to know just what time and expense may fairly be allocated to SPECS and what would be expended in any case. Nevertheless, he feels a reasonable estimate includes those costs listed in Table 12, excluding the project coordinator's salary. This brings the total cost to about $50,000.[19]

The cost of two days of teacher inservice at the beginning of the school year and at the end of each semester must be added to these costs. Although teacher inservice days were not set aside until SPECS was introduced in River Park, according to the Superintendent, these days are no longer used for strictly SPECS topics. Inasmuch as "planning days" are set aside in school districts throughout the country, it is perhaps reasonable to allocate only part of their total costs to the SPECS program. Although costs for the same services may be somewhat higher in today's market, it is important to remember that this was the first district to implement the program. Therefore, costs may decrease as districts learn to utilize more efficient methods, based on the experiences of districts like River Park.

At this time the number of Program Planning Leaders in the River Park district has declined from the original twenty-five to "between six and ten," according to the Superintendent. These leaders continue to receive up to four hours of released time per week. Assuming that eight Program Planning Leaders average three hours' released time for thirty-seven weeks of the year, the number of hours committed by the district would be 888 per year. These hours are included in the $50,000 figure for direct costs.

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[19]Interview, Superintendent, River Park Public Schools, March 29, 1976.

Durability of Component Three plans. An important factor in determining the cost of maintaining Component Three programs is the number of years each program can be retained before it is changed. Assuming that the average life of a program is four years, the cost of maintaining the program is a least one-fourth that of implementing it.

Staff turnover is a second consideration which also affects the cost of continuing the program. In general, districts have less than a 10% turnover rate.

SPECS teachers in Mott were asked what portion of their efforts from the previous year could be re-used. The six teachers who reported using their materials a second time indicated having to do an average of 40% of their program over the next year as shown in Table 13.

Table 13

Component Three Work which was Reusable After One Year in Mott

Question	Response Yes	No
1. Were you employed at this school last year?	10	3
2. If so, did you teach the same grade or program?	5	5
3. If the answers to both (1) and (2) are yes,		
(A.) Were you able to use your SPECS materials a second time?	4	1
(B.) If some changes were necessary, about what percentage of the program did you need to do again?*	Teacher (a) 25% Teacher (b) 5% Teacher (c) 80% Teacher (d) 75% Teacher (e) 50% Teacher (f) 5%	

*Includes responses of one teacher who taught a different grade.

The author assumes that those individuals who did not teach the same subject a second year and the three new teachers would have to do 100% of their work again. If seven figures of 100% are averaged with the responses of those teachers who were able to use some of their previous work, the average for the entire staff becomes 72%.

Summary

Information on the costs of implementing SPECS in several school districts was presented in this chapter. In retrospect little information is available on the costs of implementing the entire system; only the pilot district, River Park, has undertaken this task. While the dollar figures seem realistic, estimates of the number of person-hours are based on incomplete records.

A summary of district costs is shown in Table 14. These estimates are in no way definitive, but are intended to represent time spent in the districts which participated in the SPECS pilot and field test. It must be remembered that Haller's last two catergories, "costs quantifiable, but not in dollars" and "costs not quantifiable" have not been addressed. There is no information on moral shifts, changes in student attitudes, or changes in the quality of student or teacher performance. Only direct and indirect costs to the district's taxpayers have been estimated here.

Table 14

Summary of the Range of Estimated Direct Costs
and Person-Hours Expended
By Districts Implementing SPECS

	Phases	Low	High
I	Exploratory		
	Direct costs	- Negligible	-Negligible
	Person-hours	- 15	30
II	Preparatory		
	Direct costs	- $0	$ 7,000
	Person-hours	- 35 hrs.	773 hrs.
III	Implementation		
	Component I		
	Direct costs	- Negligible	-Negligible
	Person-hours	100 hrs.	150 hrs.
	Component II		
	Direct costs	$ 6,000	$25,000
	Person-hours	Undetermined	Undetermined
	Component III		
	Direct costs	$ 7,400	$33,000
	Person-hours	28 hrs.	279 hrs.
	Component IV		
	Direct costs	- Negligible	-Negligible
	Person-hours	- Undetermined	-Undetermined
	Component V		
	Direct costs	- Negligible	-Negligible
	Person-hours	- Undetermined	-Undetermined
IV	On-going Operation, per year		
	Direct cost, including central office staff	- $40,000	$55,000
	Person-hours (teachers)	28 hrs.	28 hrs.

III

COSTS TO PARTICIPANTS IN SCHOOLS RESULTING FROM THE IMPLEMENTATION OF SPECS

Participants in schools include students, teachers, administrators, and, to a smaller degree, parents and other citizens who volunteer their services. The costs to these individuals are represented primarily by time, rather than dollars. In addition, these costs also include resulting shifts in morale, changes in the self-perception of individuals, as well as other costs.

In this chapter, the amount of time required for implementing SPECS in school districts is assessed.

The Mott Study

The primary cost may be defined as the time required for teachers to plan their courses and evaluate student progress. Teachers are paid a salary, rather than on an hourly rate. Therefore, if additional time is required past those hours for which they have contracted to work, it comes "out of their own pockets."

This study is concerned with the amount of time that was spent on SPECS activities during both normal duty hours and hours outside of this period. It is also concerned with assessing whether or not time spent by teachers on SPECS-related activities influenced the time spent on other activities.

To conduct this analysis the time reported as being spent on planning and evaluation activities was assessed, as well as the time spent on instruction for two SPECS schools and four "control" schools in the Mott School District. Data were also gathered to determine whether the <u>total</u> out-of-school

time expenditure was comparable for SPECS and non-SPECS administrators. Teachers and principals in each of the six schools were asked to fill out questionnaires which were distributed at ten times during the school year. Respondents were asked to complete questionnaires on a different day of the week for each collection. Thus two collections for each day, Monday through Friday were insured. These ten collections were spread through the school year to control for variations during different times of the year.

Data cleaning. Several problems existed with this method of data gathering. Teachers in one of the SPECS schools consistently reported hours that were greater than in the other schools. For each data collection, at least one respondent reported 14 to 15 hours of daily work in math and reading. No satisfactory methods of dealing with these problems were found.

To control for outliers, a Grubbs' test[1] was performed. Approximately thirty numbers were replaced with the next largest figure using this procedure. Eighty percent of the figures rejected using Grubb's procedure were obtained from the same school and many of them came from the questionnaires which reported 14 to 15 hours spent in math and reading.

Near the end of the data gathering, several questionnaires from one school contained identical data which resulted in problems in the assessment of within-school variance. Inasmuch as there was no way of correcting for the problem, the figures remained.

Data were collected only from teachers who were in the classroom. Those who were absent for the day were excluded.

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[1]Frank E. Grubbs, in Technometrics, (February, 1969). Quoted in Leonard A. Marascuilo, Statistical Methods for Behavioral Science Research,(New York, 1971), p. 199 and Appendix, Table A-6.

Several factors also influenced the analysis of data obtained from the principals. The first was that only incomplete data could be obtained for a principal of one SPECS school who became ill at mid-year and was absent from active duty for several months. In addition, for one data collection, a principal reported spending 10 hours at a basketball tournament, a figure which was eliminated in the analysis. Data were also incomplete for several other principals. Scores in these missing cases were assumed to be zero.

Still other considerations must be taken into account in this analysis. First of all, the collection is subject to nonreporting bias since some of the questionnaires were not returned. Beyond this, data submitted by one teacher were not necessarily independent of those reported by another teacher, particularly within each school, since there was no way to control for this factor.

The questions, responses, and the data collection schedule are contained in Appendix B.

For teachers, one-way analyses of variance were run on the following dependent variables for each time period.

(1) Time spent planning, evaluating and replanning in math, the SPECS-related subject, both in and out of the duty period.

(2) Effects of SPECS planning upon attention to non-SPECS subjects, both during and after the duty period.

(3) Time spent teaching math using SPECS and non-SPECS procedures.

(4) Effects of the amount of time spent teaching math, a SPECS subject, on the amount of time spent teaching reading, a non-SPECS subject.

From these ANOVA tables the average daily incremental cost in teacher time, if any, was estimated and extended over the year.

A supplementary nonparametric test, the Wilcoxon Signed Rank Test,[2] was also performed to help guard against possible Type II errors occasioned by lack of sufficient power and to summarize the results of the ten data collections.

Power. Tests for the power of the analyses of variance are presented in the Appenix B. The probability of obtaining significant difference was very low, ranging from p = .08 to p = .23, if reported differences were as little as ten minutes per day. It is, therefore, appropriate to conclude that the tests employed were not very sensitive, and the results must be accepted in this light.

The Effects of Installing SPECS on Teachers' Time

In assessing the effects of installing SPECS on teachers' time, several major questions were addressed:

(1) What are the effects of installing SPECS Component Three on the time spent teaching the SPECS subject (mathematics)? To answer this question, the amount of time reported by teachers for teaching mathematics in SPECS schools was compared to that reported by teachers in non-SPECS schools.

The results are given in Table 15 and Figure 3. Analyses of variance performed for each of the time periods yielded a significant difference in only one time period. However, the supplementary Wilcoxon test reveals that there is a statistically significant difference between the two schools. Teachers in SPECS schools reported an average of 4.4 minutes more per day for teaching mathematics (46.1 in SPECS schools and 41.7 minutes in non-SPECS

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[2]George W. Snedecor and William G. Cochran, Statistical Methods, Sixth Edition, (Ames, Iowa: The Iowa State University Press, 1967), p. 128.

Table 15

"Minutes Reported Spent Teaching a 'SPECS Subject"
In SPECS and Non-SPECS Schools
Over Ten Data Collections with Wilcoxon Test

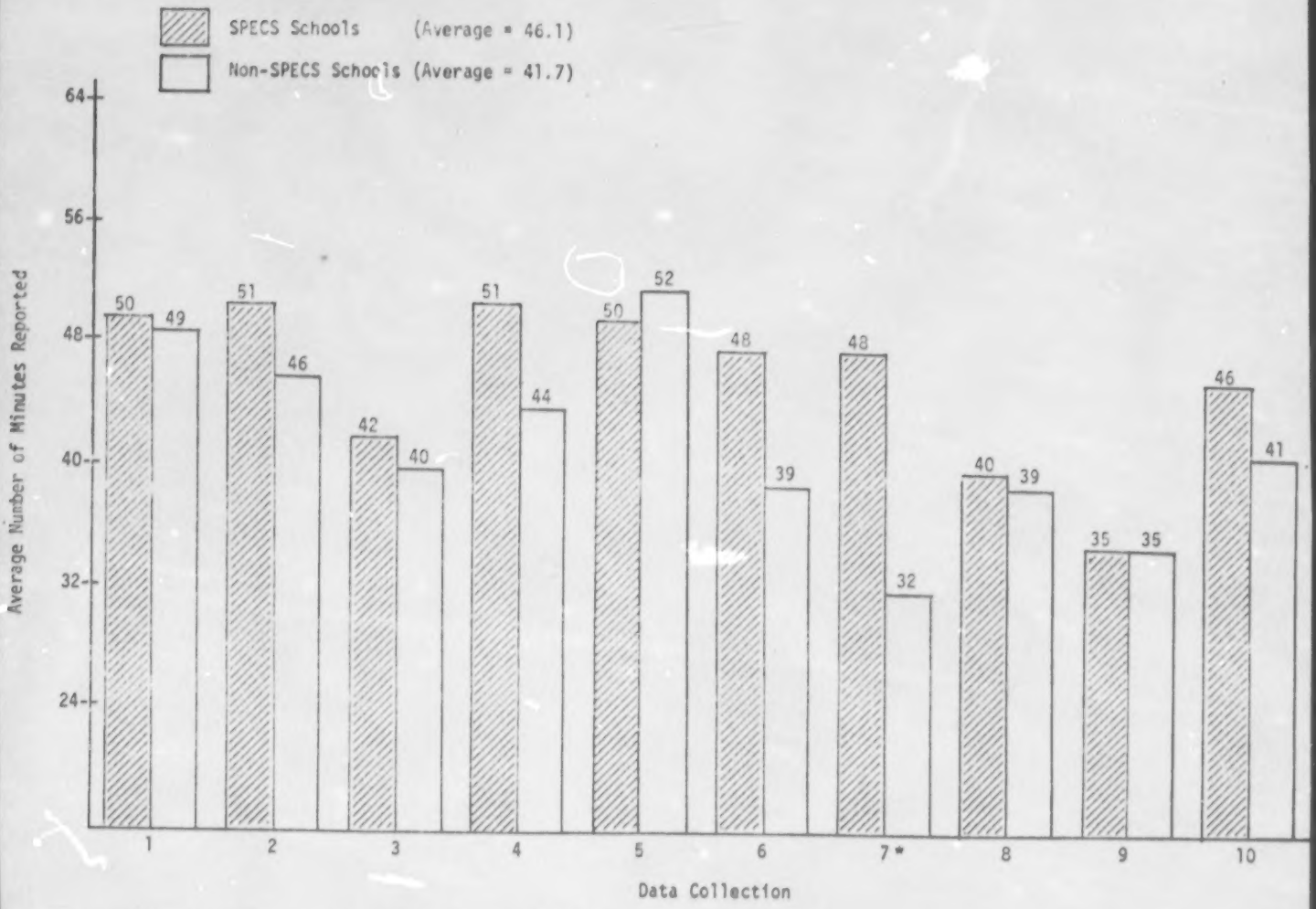
"In your class, about how many minutes did you spend on math activities today?"

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Wilcoxon Test[a]	
			Difference	Signed Rank
1	50	49	+ 1	+ 2 1/2
2	51	46	+ 5	+ 6 1/2
3	42	40	+ 2	+ 4 1/2
4	51	44	+ 7	+ 8
5	50	52	- 2	- 4 1/2
6	48	39	+ 9	+ 9
7	48	32	+16	+10
8	40	39	+ 1	+ 2 1/2
9	35	35	0	1 (+1/2;-1/2)
10	46	41	+ 5	+ 6 1/2
Average	46.1	41.7	+4.4	

[a]Wilcoxon Test Decision Rule: criterion ≤ 8.
Σneg = 4 1/2; Σpos = 49 1/2. Criterion = 4 1/2; there is a significant difference. Average difference - 4.4 minutes per data collection more in SPECS schools.

Figure 3

Time Reported by Teachers in Teaching "SPECS Subject" in SPECS & Non-SPECS Schools
Over Ten Data Collections



*Difference between SPECS and non-SPECS is significant at $\alpha = .05$ level.

schools), the subject in which they had implemented Component Three.[3] This difference results in 13.2 hours when extended throughout a 180-day school year.[4]

(2) Does SPECS Component Three involve more time in planning, preparation, and evaluation (1) during school hours and (2) after school hours? As shown in Table 16 and Figure 4, teachers in SPECS schools reported spending an average of 23.2 minutes per day during school hours on planning, preparing, and evaluating the math program compared to 14.7 minutes reported by teachers in non-SPECS schools. Only one analysis of variance yielded a significant difference; however, the Wilcoxon test showed that the time reported by teachers in SPECS schools was significantly greater than that reported by teachers in non-SPECS schools. Extended over a 180-day school year, this difference results in 25.5 hours per year.

Since teachers do not confine their efforts to the working day, the time reported for planning, preparation and evaluation of mathematics after school hours was also examined. The results are presented in Table 17 and Figure 5. SPECS teachers reported an average of 31.4 minutes, compared to 23.1 reported by teachers in non-SPECS schools. ANOVA tests yielded no significant differ-

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[3]The figures presented in this section are averages of averages of averages. For each of the ten data collections, the figure reported by each of the teachers in each school was averaged to determine an average for the school for the time period. Then the two SPECS schools were averaged to find the average SPECS figure for each time period, and the same was done for the four non-SPECS schools. These figures are presented in the six bar graphs of the data, and are not weighted averages.

In forming the overall average for the ten time periods, the averages for the SPECS schools were themselves averaged, and the same was done for the non-SPECS schools. Again, the results were not weighted by the number of teachers reporting for each time period.

[4]ANOVA summaries for all questions are presented in Appendix B.

Table 16

Minutes Reported Spent on Planning, Preparation and Evaluation During School Hours for a "SPECS Subject" in SPECS and Non-SPECS Schools, Over Ten Data Collections with Wilcoxon Test.

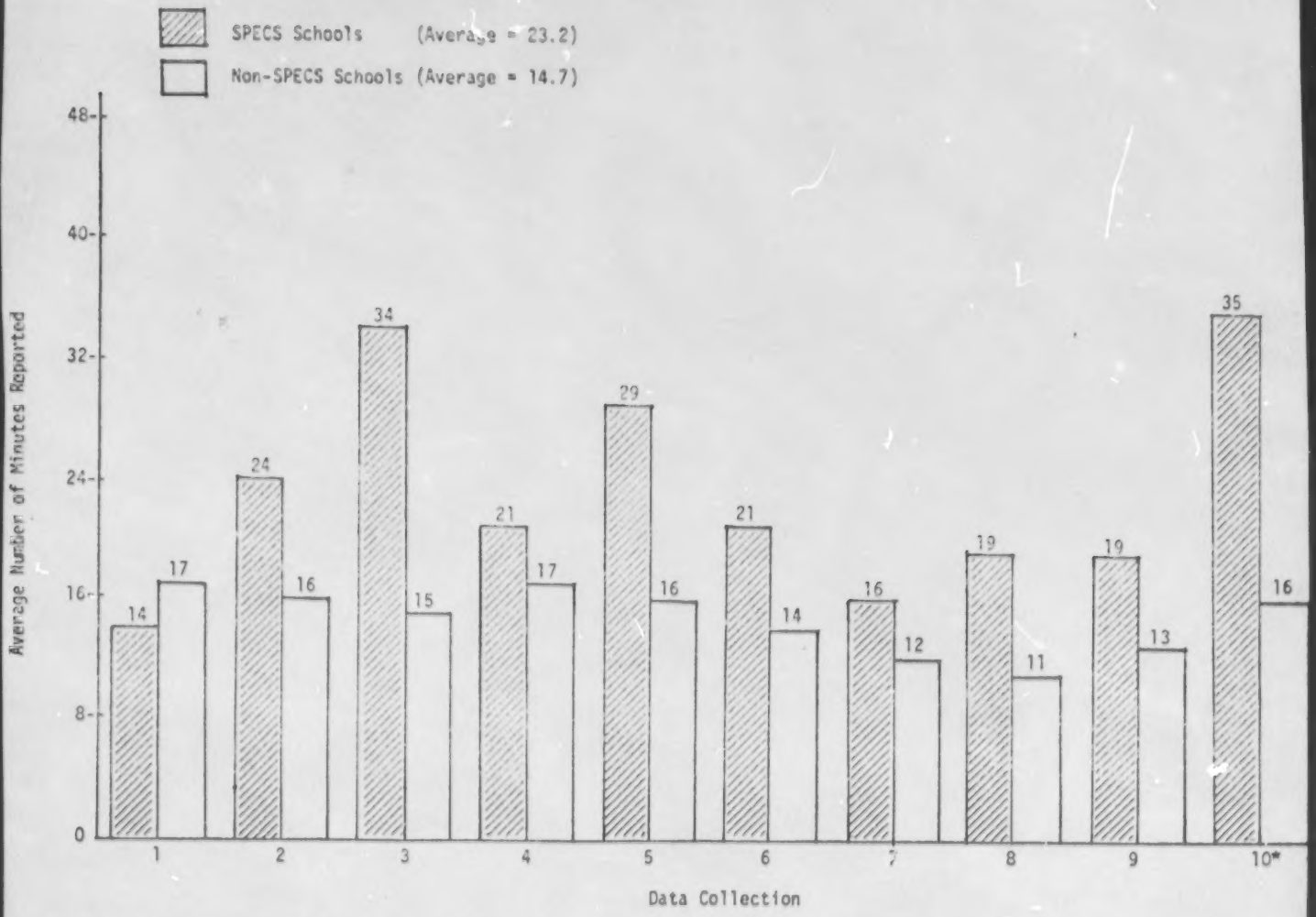
"While your children were in school, about how many minutes did you spend in planning, preparation, and evaluation activities for your mathematics program today?"

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Wilcoxon Test [a]	
			Difference	Signed Rank
1	14	17	- 3	- 1
2	24	16	+ 8	+ 6 1/2
3	34	15	+19	+ 9 1/2
4	21	17	+ 4	+ 2 1/2
5	29	16	+13	+ 8
6	21	14	+ 7	+ 5
7	16	12	+ 4	+ 2 1/2
8	19	11	+ 8	+ 6 1/2
9	19	13	+ 6	+ 4
10	35	16	+19	+ 9 1/2
Average	23.2	14.7	8.5	

[a] Wilcoxon Test Decision Rule: Criterion < 8 (as before)
Σ neg = 1; Σ pos = 53 so criterion = 1 and a significant difference exists. In SPECS schools, average is 8.5 minutes more per day.

Figure 4

Time Reported Spent on Planning, Preparation and Evaluation of a "SPECS" Subject, During School Hours in SPECS and Non-SPECS Schools, Over Ten Data Collections



*Difference between SPECS and non-SPECS is significant at $\alpha = .05$ level.

Table 17

Minutes Reported Spent on Planning, Preparation and Evaluation After School Hours for a "SPECS Subject" in SPECS and Non-SPECS Schools, Collections with Wilcoxon Test

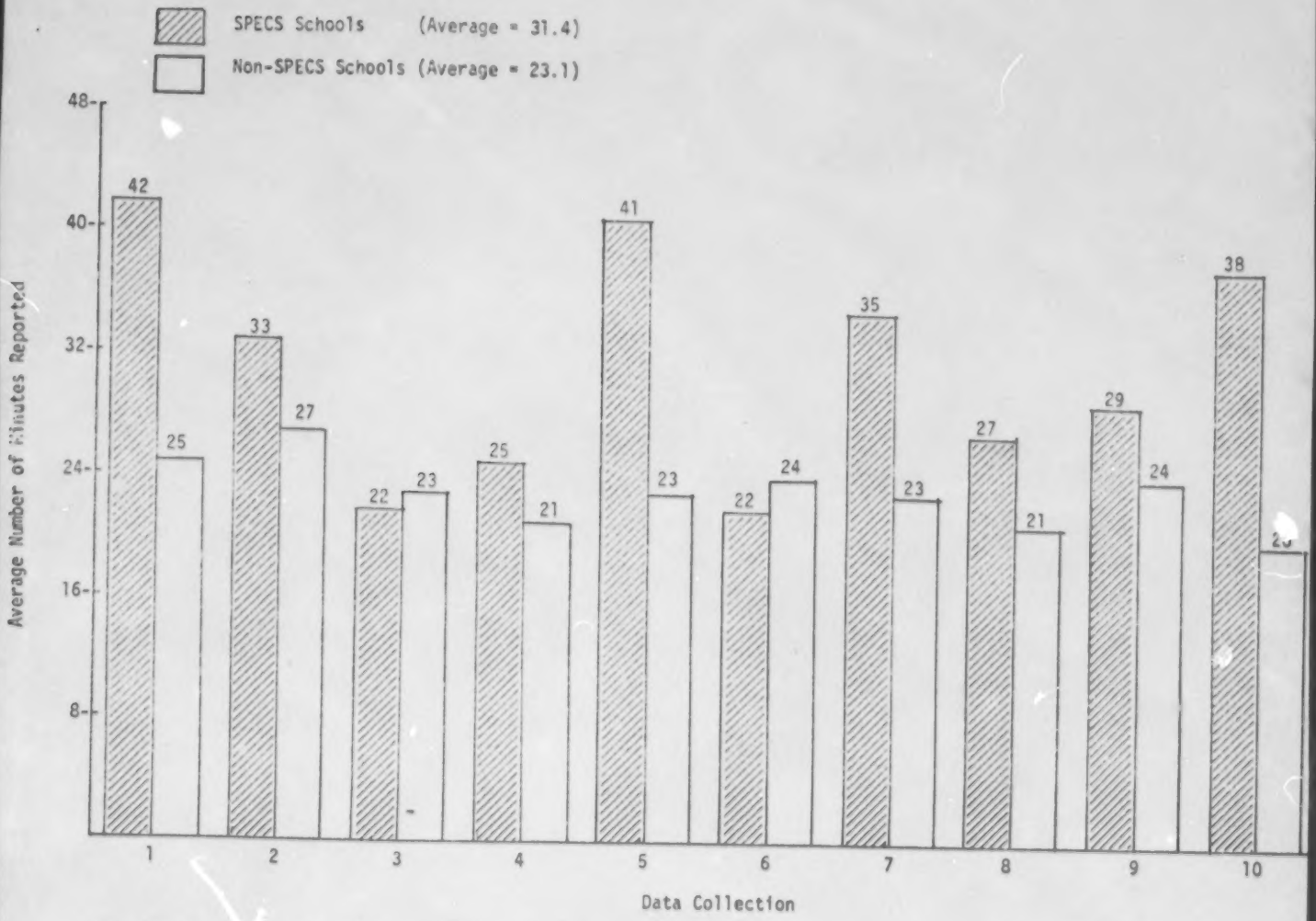
"After your students went home yesterday (or Friday, if this is a Monday), and before they came back to class this morning, about how many minutes did you spend on all activities related to planning, preparation and evaluation in mathematics?"

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Wilcoxon Test[a]	
			Difference	Signed Rank
1	42	25	+17	+ 8
2	33	27	+ 6	+ 5 1/2
3	22	23	- 1	- 1
4	25	21	+ 4	+ 3
5	41	23	+18	+ 9 1/2
6	22	24	- 2	- 2
7	35	23	+12	+ 7
8	27	21	+ 6	+ 5 1/2
9	29	24	+ 5	+ 4
10	38	20	+18	+ 9 1/2
Average	31.4	23.1	+ 8.3	

[a]Wilcoxon Test Decision Rule: criterion ≤ 8 (as before)
Σ neg = 3; Σ pos = 52 so criterion = 3 and a significant difference exists. SPECS schools average 8.3 more per day.

Figure 5

Time Reported Spent on Planning, Preparation and Evaluation for a "SPECS" Subject In SPECS and Non-SPECS Schools, After School Hours, Over Ten Data Collections



No differences were significant at the $\alpha = .05$ level.

ences; as before, however, the Wilcoxon test showed figures reported by teachers in SPECS schools to be significantly higher. The mean difference of 8.3 minutes per day translates into just under 25 hours per year.

In summary, teachers using SPECS reported spending an average of 50 more hours in planning, preparation, and evaluation of mathematics than teachers who used a non-SPECS approach. However, it is particularly important to remember that teachers reported their own scores. (A 'double-blind' collection would have yielded more secure results.)

(3) Does the implementation of Component Three in one subject effect the amount of time spent teaching other non-SPECS subjects? Reading was chosen as the non-SPECS subject area for examination since all elementary teachers could be expected to teach this subject. In addition to traditional reading activities, this subject also included language arts, writing, spelling, and phonics.

The time reported by teachers in SPECS schools as being spent teaching reading was compared to the time reported by teachers in the non-SPECS schools. The results are presented in Table 19 and Figure 6. The mean for SPECS schools is 131.9 minutes and for non-SPECS schools it is 133.8 minutes. Neither the ANOVA'S nor the Wilcoxon Tests revealed a statistically significant difference. Therefore, the use of SPECS in one subject was reported to have no effect upon the time spent teaching a non-SPECS subject.

(4) Does the implementation of SPECS in one subject effect the amount of time spent in planning, preparation, and evaluation, of a non-SPECS subject (1) during school hours and (2) after school hours? The time spent on planning, evaluation, and preparation for teaching during school hours is presented in Table 19 and Figure 7. SPECS teachers reported spending an average of 42.4 minutes per day compared to 30.3 minutes reported by non-SPECS teachers.

Table 18

Minutes Reported Spent Teaching a "Non-SPECS Subject" in SPECS and Non-SPECS Schools, Over Ten Data Collections with Wilcoxon Test

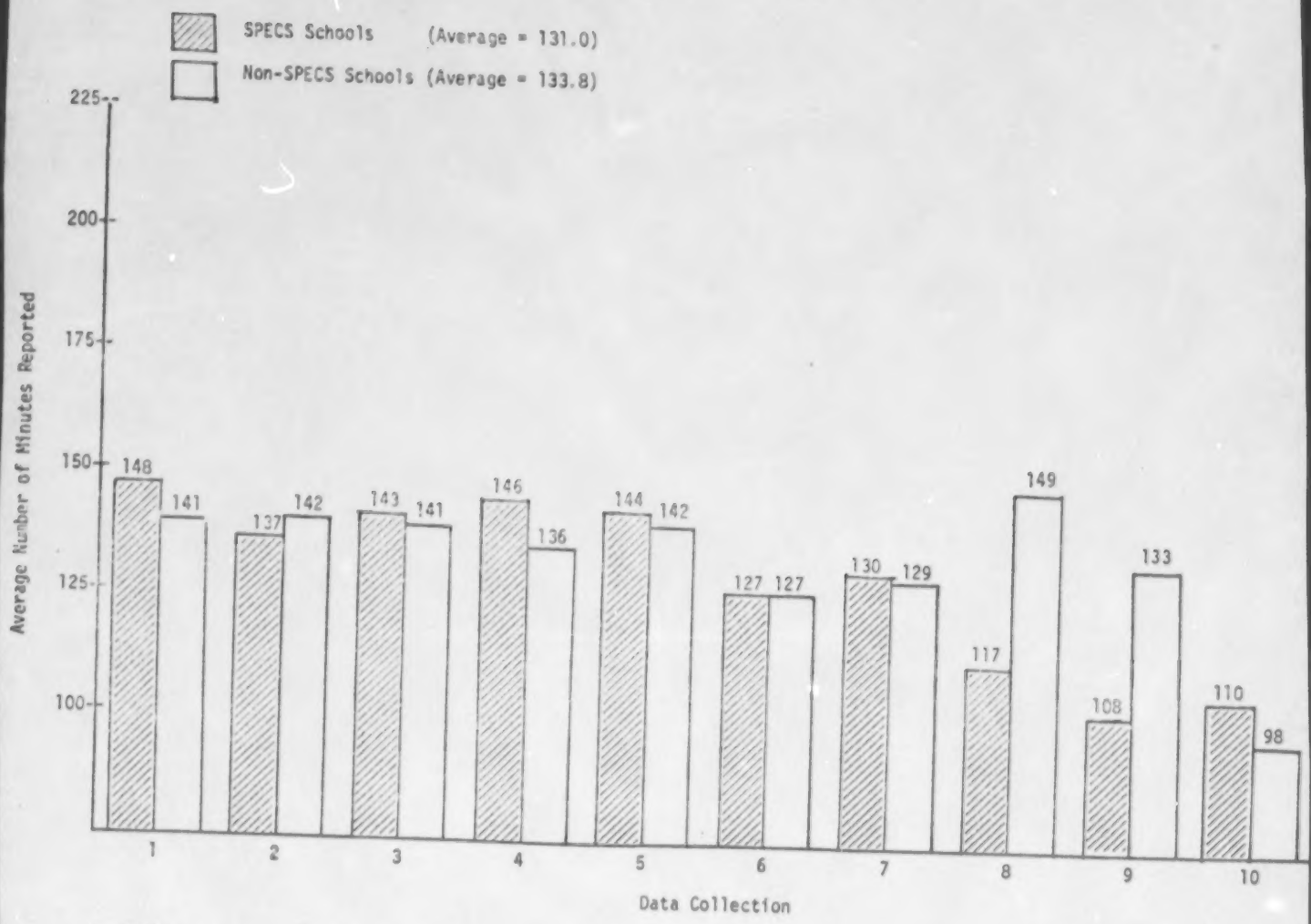
"In your class, about how many minutes did you spend on reading, language arts, writing, spelling, and phonics activities today?"

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Wilcoxon Test[a]	
			Difference	Signed Rank
1	148	141	+ 7	+ 6
2	137	142	- 5	- 5
3	143	141	+ 2	+ 3 1/2
4	146	136	+10	+ 7
5	144	142	+ 2	+ 3 1/2
6	127	127	0	1 (+1/2; -1/2
7	130	129	+ 1	+ 2
8	117	149	-32	-10
9	108	133	-25	- 9
10	110	98	+12	+ 8
Average	131.0	133.8	-2.8	

[a]Wilcoxon Test Decision Rule: criterion must be ≤ 8 (α = .05)
Σ neg = 23 1/2; Σ pos = 30 1/2; ∴ criterion = 24 (not significant).

Figure 6

Time Reported Teaching a "Non-SPECS Subject" in SPECS AND Non-SPECS Schools, Over Ten Data Collections



No differences were significant at the $\alpha = .05$ level.

Table 19

Minutes Reported Spent on Planning, Preparation and Evaluation During the School Hours on a "Non-SPECS Subject" in SPECS and Non-SPECS Schools, Over Ten Data Collections with Wilcoxon Test

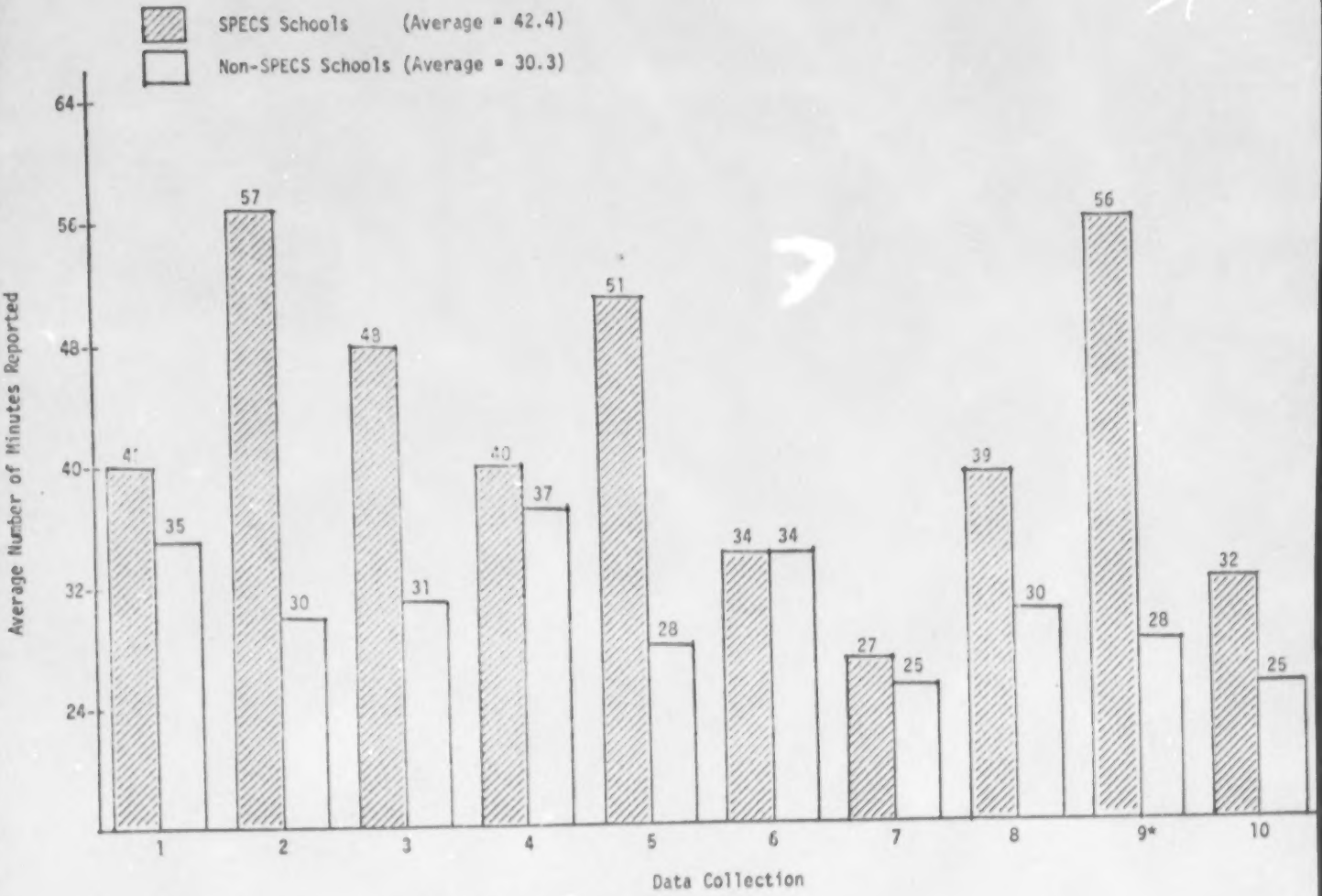
"While your children were in school today, how many minutes did you spend on all activities related to planning, preparation and evaluation for reading, language arts, writing, spelling and phonics?"

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Wilcoxon Test[a]	
			Difference	Signed Rank
1	40	35	+ 5	+ 4
2	57	30	+27	+ 9
3	48	31	+17	+ 7
4	40	37	+ 3	+ 3
5	51	28	+23	+ 8
6	34	34	0	1 (+1/2; -1/2)
7	27	25	+ 2	+ 2
8	39	30	+ 9	+ 6
9	56	28	+28	+10
10	32	25	+ 7	+ 5
Average	42.4	30.3	+12.1	

[a]Wilcoxon Test Decision Rule: criterion < 8 (as before)
Σ neg = 1/s; Σ pos = 54 1/2 ∴ there is a difference. Average difference = 12.1 minutes per data collection in SPECS schools.

Figure 7

Time Reported Spent on Planning, Preparation and Evaluation of a "Non-SPECS Subject" in SPECS and Non-SPECS Schools During School Hours, Over Ten Data Collections



*Difference between SPECS and non-SPECS is significant at $\alpha = .05$ level.

Only one analysis of variance for each time period revealed a significant difference at the $\alpha = .05$ level between the groups. The Wilcoxon test showed significance, however. One may conclude that SPECS teachers reported spending significantly more time (approximately 12.1 minutes) during school hours on planning preparation, and evaluation of a non-SPECS subject than non-SPECS teachers. This translates to approximately 36.3 hours over a 180-day year.

The results of data reported by teachers on time spent after school hours on these activities are presented in Table 20 and Figure 8. SPECS teachers reported spending an average of 60.6 minutes per day, and non-SPECS teachers reported spending an average of 47.8 minutes after school on reading. Analyses of variance for each of the ten data collections yielded only one that was significant. Again, however, Wilcoxon tests showed that over the ten periods the differences were significant. The reported difference of 10.8 minutes extended to 50.4 additional hours spent outside of school by SPECS teachers in non-SPECS subjects over the school year.

Therefore, SPECS teachers reported spending significantly more time on planning, preparation, and evaluation of a non-SPECS subject than non-SPECS teachers. This included approximately 12.1 additional minutes per day during school hours and an additional 10.8 minutes per day outside of school hours.

Interpreting the differences. In summary, teachers in the two SPECS schools in Mott reported spending significantly more time than those in four of Mott's non-SPECS schools in teaching mathematics, the subject in which they introduced SPECS Component Three. They similarly reported spending more time in planning, preparation and evaluation of mathematics. The teachers did not report spending more time than non-SPECS teachers in teaching reading, a non-SPECS subject; but they did report spending more time in planning, preparation, and evaluation of the non-SPECS subject. Therefore, although SPECS teachers reported spending

Table 20

Minutes Reported Spent on Planning, Preparation and Evaluation After School Hours on a "Non-SPECS" Subject in SPECS and Non-SPECS Schools, Over Ten Data Collections with Wilcoxon Test

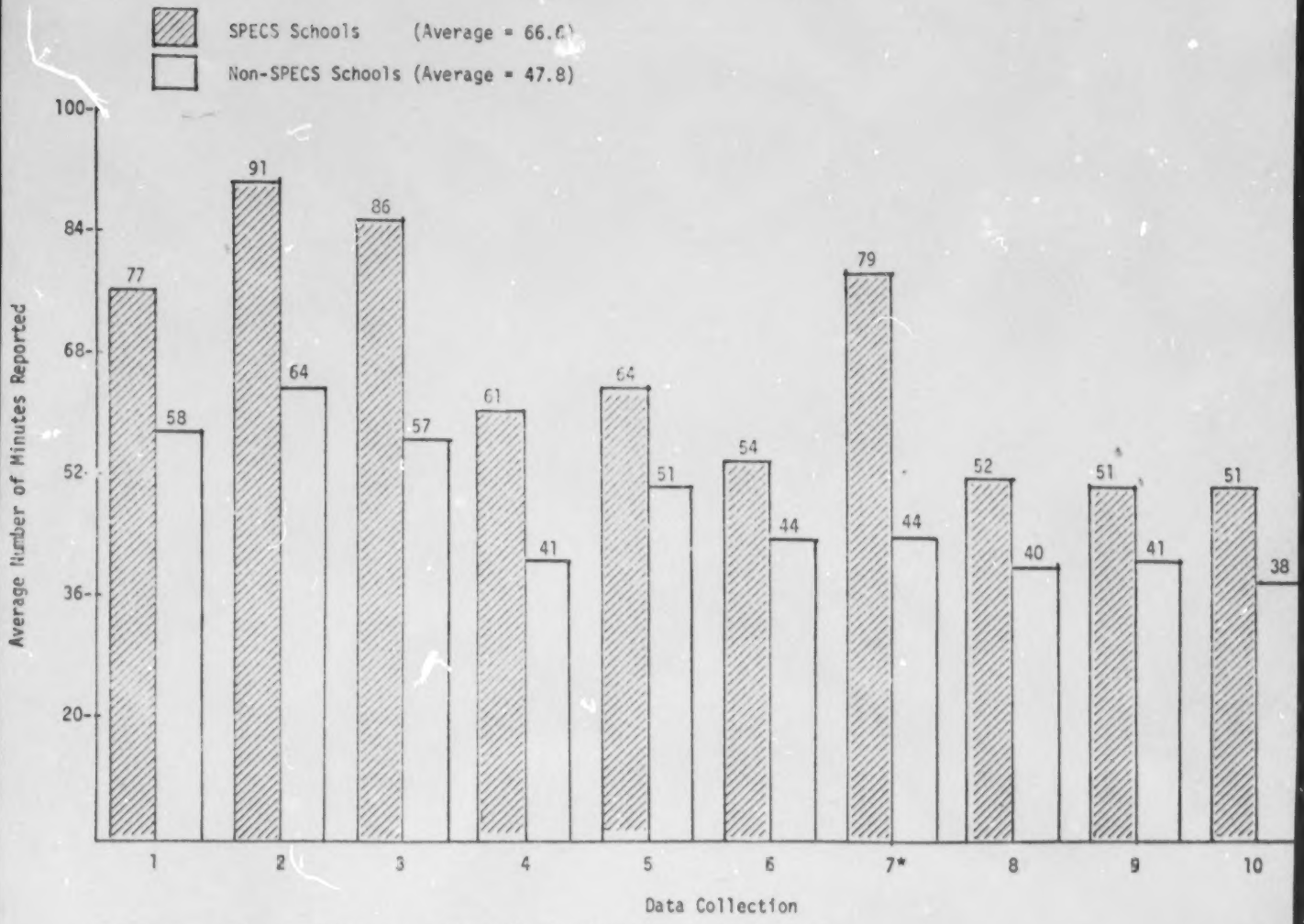
"After your students went home yesterday (or Friday), if this is a Monday), and before they came back to class this morning, about how many minutes did you spend on all activities related to planning, preparation and evaluation for reading, language arts, writing, spelling, and phonics?"

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Wilcoxon Test[a]	
			Difference	Signed Rank
1	77	58	+19	+ 6
2	91	64	+27	+ 8
3	86	57	+29	+ 9
4	61	41	+20	+ 7
5	64	51	+13	+ 4 1/2
6	54	44	+10	+ 1 1/2
7	79	44	+35	+10
8	52	40	+12	+ 3
9	51	41	+10	+ 1 1/2
10	51	38	+13	+ 4 1/2
Average	66.6	47.3	+19.3	

[a]Wilcoxon Test Decision Rule: criterion ≤ 8 (as before)
Σ neg = 0; Σ pos = 54 so criterion = 0 and a significant difference exists. Average is 19.3 minutes more in SPECS schools.

Figure 8

Time Reported Spent on Planning, Preparation and Evaluation of a "Non-SPECS Subject" After School Hours in SPECS and Non-SPECS Schools, Over Ten Data Collections



*Difference between SPECS and non-SPECS is significant at $\alpha = .05$ level.

more time on a SPECS subject, they also reported spending more time on a non-SPECS subject.

One explanation for this may be that SPECS was introduced into schools where teachers simply spent more time. (Although it is possible that SPECS was introduced into schools where teachers already spent relatively longer hours, a pre-post design would be required to answer this question.) Or,they may not actually have spent more time, but they perceived themselves as spending more time than the non-SPECS teachers. Another explanation might be that the teachers in the SPECS schools were also using SPECS in reading. According to Mott's Curriculum Director, teachers in all elementary schools in the district were using the Ginn 360 reading program, which has a management system similar to SPECS Component Three. According to the Curriculum Director, a substantial amount of time was required to use this "management system" and although both SPECS schools were using the "management system," only some of the non-SPECS schools were using the system.

The Curriculum Director also said that a teacher in one of the SPECS schools was using the Distar reading program which required additional time in planning, preparation and evaluation.

A teacher from the SPECS school which reported the greatest number of hours spent teaching reading activities provided another explanation of the difference in planning time. According to the teacher, the school had only one teacher per grade and each teacher provided for three distinct reading levels in his or her classroom. This teacher added that this probably did not occur in the other five schools. If this explanation is correct, the extra planning time may not be related to the introduction of SPECS.

Comparing these results with other studies. Although very little data have been gathered regarding teacher time expenditures while implementing SPECS,

some is available.

Interviews were conducted in Mott and Tubman in May 1975, to determine teachers' and administrators' perceptions about SPECS. Teachers were asked how much time they spent in planning for the subject in which they were implementing SPECS. Forty-four percent of the teachers in Mott indicated that they now spent more time on planning, preparation, and evaluation of math than before they began using SPECS. Others said they had spent extra time initially, but that this was no longer the case.[5] Those teachers who reported spending extra time indicated an average of 1.8 hours per week additional time after SPECS was introduced. If this average of 1.8 hours that 44 percent of the teachers reported spending is extended to the entire population of teachers implementing SPECS in the district, an average of 0.8 extra hours per week was reportedly spent as a consequence of SPECS, or less than 30 hours per person for the entire year.

In Tubman, 54 percent of the teachers reported that their activities required more time using the SPECS format, indicating an average increment of 2.3 hours per week.[6] Extending this increment over the entire population results in an average increment of 1.24 hours per week spent by teachers in Tubman, or approximately 45 hours per person for the year.

Data were obtained for the Anthony School District through interviews with teachers at the end of the district's first month of implementation. It was found that, in general, efforts are more time-consuming at the beginning of implementation, and several teachers indicated they had spent more time than

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[5]Sundra Gregory, "SPECS in Two Districts: The Perceptions of Teachers and Administrators" Eugene, OR, Center for Educational Policy and Management, University of Oregon, 1975, p. 19. Note: Mott is referred to by the name "Pine" in this paper, and Tubman by ""anle."

[6]Ibid., pp. 19-20 .

before using SPECS in this early stage of implementation. Although one teacher reported spending 175 hours, 75-80% (or 130-140) of which was directly related to SPECS, two other teachers responded to the question with estimates of 35-30 hours and 25-30 hours.[7] Several others indicated that time was a problem but estimates were not given of the time spent. One new teacher reported no problems with time.

The Effects of Installing SPECS on Principals' Time

The expenditure of out-of-school hours reported by SPECS principals was compared with that for non-SPECS principals. As was done in the teacher portion of the study, each principal submitted information regarding the number of hours spent the evening before. However, no effort was made to determine whether or not the principals' efforts were related to SPECS activities.

Unfortunately, one of the two SPECS school principals became ill in January, after completion of only four data collections. Therefore, some reports were not completed, while others were completed by a different person than the one who initially began them. In the case of missing data, zeroes were used as the figures.

A repeated measure design was used for this analysis. A simple two-way ANOVA design exists, similar to the one-way ANOVA design for teachers. As shown in Table 21, the six principals reported spending significantly different amounts of time, with two SPECS principals reporting an average of 57.9 minutes over the ten time periods and the four non-SPECS principals reporting an average of 52.6 minutes. The standard deviations were, however,

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[7]Information on file, Anthony Public Schools, September 22, 1975.

Table 21

Time Spent by Principals in Six Schools over Ten Time Periods, Two for Each Day of the Week: F-Test Between Schools and Between Days

Source	d/f	Sum of Squares	Mean Squares	F	ω^2
Between Schools	5	42,786.08	8,557.22	2.88*	.18
Between Days	4	15,545.43	3,886.36		
Days x School Interaction	20	84,995.17	4,249.76		
Within	30	89,119.50	2,970.65		
Total	59	232,446.18			

*Decision Rule: Reject null hypothesis if p .05: $F_{6,53} = 2.28$

Post-hoc contrast:

SPECS: $\bar{x} = 57.9$, $\sigma = 63.51$, $N = 20$ (2 persons)

Non-SPECS: $\bar{x} = 52.63$, $\sigma = 63.13$, $N = 40$ (4 persons)

wide (63.5 and 63.1 respectively), and the differences were not significant at the $\alpha = .05$ level. The power of the analysis was .094 (see Appendix P).

As with the teacher time study, a supplementary Wilcoxon Test was performed. The results, however, were not significant as shown in Table 22. Therefore, there was no significant difference in the time reported spent by principals after school hours in SPECS schools and those in non-SPECS schools.[8] It must be remembered, however, that a sizable portion of the data in one of the SPECS schools

[8]Question and raw data are presented in Appendix P.

Table 22

Minutes Reported Spent Working After School Hours By Principals in SPECS and Non-SPECS Schools, Over Ten Data Collections

Wilcoxon Test *

Data Collection	Average SPECS Schools	Average Non-SPECS Schools	Difference	Signed Rank
1	90	53	+37	+ 6
2	150	43	+107	+10
3	15	50	-35	- 5
4	53	109	-56	- 8
5	113	49	+64	+ 9
6	0	15	-15	- 3
7	34	21	+13	+ 2
8	40	64	-24	- 4
9	20	60	-40	- 7
10	65	64	+ 1	+ 1
Average	57.0	52.6	+ 5	

aWilcoxon Test Decision Rule: criterion ≤ 8, Σ neg = 27; Σ pos = 28. Criterion = 27, no significant difference.

was missing and replaced by zeros. In addition, no attempt was made to determine how many hours were actually spent by principals in the SPECS schools on SPECS-related activities.

The Effects of Installing SPECS on Students, Parents, and Citizens

Costs to district taxpayers, to teachers and to administrators have already been delineated. As indicated in the discussion of costs in Chapter I, however, one must also consider the costs to others as well: students spend many hours in school, presumably investing in their future; parents are in some ways involved in various school and district activities and some citizens play a role in the operation of the school beyond that of paying taxes.

One important consideration about the impact of implementing SPECS is its effect on students and student performance. Theoretically, educated students are the end products of the educational system, and in discussions of the effects of educational innovations one should address the question of the differential impact produced by the innovation on student performance.[9] However, since it was not possible to give pre- and post-tests to students in the Mott School District before and after SPECS implementation, there is no information on the effects (i.e. costs or benefits) of the implementation of SPECS on students.

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[9]However recent investigations of various other educational innovations have failed to reveal any consistent, statistically significant marginal impact on the student population's performance levels. The reasons for this are complicated and sometimes mysterious, but recent findings suggest that student outcomes are sometimes ignored in educational research.

The costs of SPECS implementation to parents and citizens have already been discussed, inasmuch as the costs of operating a district are borne by local, state and federal taxpayers. However, additional "costs" also accrue to parents and citizens who attend meetings or otherwise assist in the operation of the school.

In order to gain legitimacy, many school district personnel ask for citizens to examine an innovation, approve it, and participate (at least in token fashion) in its implementation. This takes time, and, as discussed in Chapter I, time has an opportunity cost. For this reason, it is appropriate to ask whether the implementation of SPECS requires more time commitments from parents and other citizens than are required without SPECS.

Component Four of SPECS also calls for the participation of the community in setting broad educational goals and priorities. However, since the data collected in this study included little information about community participation it is not feasible to estimate the amount of time Component Four requires.

Summary

While conclusions about the costs of installing SPECS in terms of time required must remain tentative, some generalizations can be made.

Teachers who are teaching mathematics according to the SPECS format reported spending more time teaching the subject than control teachers. They also reported spending more time outside of class in activities related to mathematics. The additional number of hours reported spent in teaching mathematics was only thirteen hours over the entire year; however the planning time, both during and outside of school hours, was estimated to differ by about fifty hours per year.

Teachers involved in teaching mathematics using the SPECS format might have been expected to invest fewer hours in other subjects. The time spent in teaching a non-SPECS subject, reading, was assessed to determine whether or not this was true. The results showed that teachers in SPECS schools did not report spending significantly less time teaching the non-SPECS subject; in fact, teachers in the SPECS school reported spending more time in planning, evaluation and preparation for reading, the non-SPECS subject.

School principals did not report spending significantly different amounts of time outside of school in SPECS and non-SPECS schools.

An appropriate conclusion to be drawn from this chapter is that teachers using SPECS in mathematics seem to spend more time than those using a traditional approach. The data in the study indicate that the additional number of hours is substantial; however, beyond estimating the increment at 50 hours per year for mathematics, no data are available for estimating the time required for implementing SPECS in other subjects.

IV

THE COSTS OF OTHER PPBS INSTALLATIONS

In addition to SPECS, other PPB systems also exist, and it may be useful here to recount what is known about the costs of implementing these systems.

The early proponents of PPBS realized that changing to a systems format would require additional resources. Steven J. Knezevich, author of a book on program budgeting[1] suggests that a small district will need to budget a minimum of $20,000 per year for this purpose, while a district enrolling over 25,000 students may require up to $75,000 per year. In addition, Knezevich suggests that at least one person be assigned to coordinate the activities. Assuming that a coordinator's salary is $20,000 per year, plus 14% for benefits, Knezevich's dollar estimates reach $42,000 per year for smaller districts and approximately $100,000 for larger ones.

Sue Haggart, who directed federal research several years ago for RAND on the implementation of PPB systems, notes that there is little data regarding the costs of implementing other PPB systems. She points out that one problem in attempting to gather such data is that complete systems have only rarely been implemented. Added to this is the factor that implementation costs lie in categories which were previously funded, perhaps under a different heading. Consequently, incremental costs must be determined for a number of areas and, in addition, those costs related to the PPBS installation must be separated from those occasioned by all other causes.[2]

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[1]Steven J. Knezevich, Program Budgeting (PPBS): A Resource Allocation System for Education (Berkeley, CA, 1973).

[2]Telephone conversation, May 13, 1976.

Experiences of Other Districts and States

Montgomery County, Maryland. In Montgomery Country, Maryland, out-of-pocket costs for installing the program budget portion of another PPB system reached $50,000 per year for three years. These costs also included costs of community participation in goal setting. Funds were also spent for staff orientation, summer workshops, and developing appropriate performance measures, in addition to organizing a budgeting system.[3] These costs would probably be considerably less today, now that more information is available regarding implementation of program budgets.

Oakland, California. Oakland, California, a large ethnically diverse district, has spent over five years working with citizens to determine citizens' goals for their districts.

A wide range of tasks was undertaken in Oakland. Planning committees, including parents and other community persons, were set up in many schools. Six citywide tasks forces worked on various problems, reporting their findings to the Board of Education. A central committee coordinated the entire operation with the help of consultants who were called in from other communities. Six full-time community liaison people were hired to facilitate the operation.[4] Despite the range of activities, the major focus was on defining community goals and resolving differences, much like the task defined by SPECS Component four.

All these activities have been costly: $750,000 has been spent over five years in this urban district.[5] On a per-child basis, however, the cost

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[3]Jesse Burkhead, "Economics Against Education," Teachers' College Record, 75(2):201 (December 1973).

[4]Frederick Willman and Frederick Eberstadt, Developing a Sense of Community: A Report on the Master Plan of the Oakland Unified School District (Oakland, CA, November 1975).

[5]Conversation with Elliott Medrich, April 6, 1976.

has been more reasonable. If one considers the enrollment as of 1973 midway through the project, the cost per child for each of the five years was about $2.50.

California. California offered a bonus of $12,000 to districts implementing program planning, goal setting and budgeting; 200 applications were submitted by districts for these small grants.[6]

Oregon. In Oregon, similarly, the State Department of Education plans to implement a PPB system for only a few thousand dollars per district.[7]

Michigan. Michigan's efforts, by contrast, developed into an expensive, statewide data-collection effort. Efforts of the State Department of Education were oriented toward goal setting and measurement of student achievement. The Department spent $248,000 developing a statewide goals and implementing a program to assess whether fourth and seventh grade students had achieved competence in designated areas.[8] (This figure did not include costs borne by local districts in Michigan.)

Maryland. One of the more extensive early efforts to implement PPBS in schools was coordinated by the Cooperative Accountability Project in Denver Colorado. Officials in the Maryland State Department of Education which participated in this project, recently completed an assessment of the costs of implementing PPBS based on a 1970-1971 survey of Maryland districts.

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[6]As with the case in Maryland, this interest was exhibited several years ago. Michael W. Kirst, "The Rise and Fall of PPBS in California" Phi Delta Kappan, 56(8):538, April 1975.

[7]Conversation with Ed Sanford, Head, Business and Auxiliary Services, Oregon Department of Education, May 25, 1976.

[8]Despite this expenditure the state was unable to answer the question of whether the state's 4th and 7th graders were succeeding or not, since there was no established standard of performance. Jerome T. Murphy and David W. Cohen, "Accountability in Education: The Michigan Experience," The Public Interest 36:60, Spring 1974.

At that time little implementation of the project portion of the student assessment had been completed.[9] The costs revealed were, therefore, developmental costs, corresponding roughly to preparatory costs in the SPECS system.

Each of Maryland's 24 districts was defined by enrollment as falling into one of three groups--small, medium or large. District personnel were asked to estimate of the number of "man-days [sic] per year" and the number of dollars expended on several activities. In addition, project directors in each of the districts were asked how accurate they believed their own estimates to be.

The facets of accountability systems for which costs were estimated were:[10]

(1) Educational Goal Development. "Those activities associated with the establishment of school board statements of educational emphasis and direction as developed by boards of education and school administrators. Such statements result from community, professional and student information sources, and result in statements including both programmatic and priority information." This corresponds to Component Four of SPECS.

(2) Objective Development. ". . . those activities associated with the establishment of statements relevant to particular programs of curricular areas which will facilitate the communication between the administration and the classroom. The purpose is to permit the evaluation of such programs and curricular attempts. They are seen as the interpretation of Educational Goals as they are applied at the classroom level to provide feedback and information at the student level."

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[9]Maryland State Department of Education, Costs of Educational Accountability: A Maryland Exploratory Study (Denver Colorado: Cooperative Accountability Project, 1974).

[10]Ibid., pp. 10-12. The figures are presented as "Development and Implementation Costs." However, Stephen P. Polowenzak, Research Consultant for the project informed the author that the figures represent development costs only.

(3) Status Survey. Essentially the status survey is the testing of students to determine whether or not the objectives have been met. Objective development and the status survey generally correspond to Component Three of SPECS.

As shown in Table 23, the costs of developing district goals averaged $8,465 for small districts, $30,801 for medium-size districts, and $55,358 for districts enrolling over 50,000 students. For the two smaller categories the range extended from as little as $2,400 to as much as $48,000. Per-pupil costs for the same groups ranged from $.89 to $2.92.

As indicated earlier, these figures are estimates of direct costs, and do not include figures for contributed time.

Developing objectives proved to be more expensive. For small districts the average estimated cost was $9,737. In middle-sized districts, the figure was $34,661 and for the large districts the figure given was $171,483. Per-pupil costs averaged $1.87 and $1.24 respectively.

The figures for the status survey represent anticipated costs. For SPECS, these costs would be included in Component Three. For small districts, the anticipated cost of the status survey averaged $17,715; for medium-size districts, $45,774; and for districts enrolling over 50,000 the anticipated cost averaged $77,267.

Apparently, nothing was done with the information reported by the districts on the number of "man-days per year" required for these three tasks. This is unfortunate, inasmuch as the data would be valuable to potential adopters of accountability systems.

Table 22

Summary of Cost Estimates of Implementing an Accountability Program as Reported by Maryland Districts*

Activity Estimated Direct Costs of	Size of District					
	Under 10,000		10,000-50,000		Over 50,000	
	Total Cost	Mean Per-Pupil Cost	Total Cost	Mean Per-Pupil Cost	Total Cost	Mean Per-Pupil Cost
1. Goal Development & Implementation	$8,400	$1.59	$30,801	$1.66	$55,350	$ .40
2. Objective Development & Implementation	2,730	1.82	34,001	1.87	171,483	1.24
3. Status Surveying	17,710	2.99	45,774	2.31	77,206	.62

*From Costs of Educational Accountability: A Maryland Exploratory Study. Denver, Colorado: Cooperative Accountability Project, 1974, p.26.

The Maryland researchers were reportedly dissatisfied with the results of their efforts for several reasons. They felt the instructions given to accountability project directors could be misinterpreted. In many cases cost estimates had not been developed in the districts, and a substantial amount of guessing went on.[11]

Variation in the number of dollars reported by the districts was also undoubtely attributable to differences in the number of dollars spent by the district. For example, goals could be developed after one meeting or a hundred. There was also the ubiquitous question of just how intensively the

[11]Following the completion of this project the State Education Department, under the leadership of Stephen P. Wolowenzak, developed a model for assessing educational cost. Unfortunately for the SPECS researchers it became available only as this project was drawing to a close. The model, titled An Objective Referenced Program Cost Model for Educational Management, was sponsored by the Cooperative Accountability Project.

individual districts had carried out the mandates of the Department of Education. Due to these factors, a fair amount of variation was to be expected in the reported data.

The Maryland State Department also attempted to determine the costs of developing a "program development" component which involved matching student performance data with the goals and objectives, similar to the process described by SPECS Component Five. However, inasmuch as the system hadn't been put into operation at the time the study was done, there was no information regarding the costs of the matching process.

Summary

These experiences indicate that installing PPBS was expensive for those districts which were involved. The costs for those districts which entered the program early in its development were higher than those which began later. Implementing the program budget was particularly onerous. The costs for developing program goals and objectives, and for developing measures for them, are less well defined; and the data on community goal definition and the setting of educational priorities seems to indicate that, although the process is normally relatively expense-free, it can be extremely expensive.

In the final chapter, these data will be compared with that of the previous two chapters.

V

CONCLUSIONS AND RECOMMENDATIONS

Americans place a great deal of responsibility on their educational systems. Leon M. Lessinger wrote:

> By all counts, America has the most extensive and expensive school system in the world. Its students stay longer, are offered the most variety of programs, have the best paid teachers, and are housed in comparatively adequate facilities. It sends more students on to college than any nation in the world, and has an enviable supply of textbooks and other materials for use by its staff and clients. But what of its productivity? What are the American people receiving in terms of student accomplishment for all this expense? Surprisingly, perhaps, it is not possible to answer.[1]

PPBS was developed to help answer such questions. But the implementations proved cumbersome, and questions arose about the accompanying costs of installing PPBS.

Conclusions

The costs of installing the SPECS system have been difficult to assess, and the conclusions about those costs must remain tentative.

Component One. The cost of conducting a systems analysis of a district depends upon the level of detail desired as well as on the size and complexity of the district.

The SPECS Development Team envisioned that Component One would provide a "blueprint" for Component Two, program budgeting and cost accounting. But inasmuch as the categories of programs for the program budget have by now become standard, it is also possible for district personnel to utilize the district's work in Component Two to complete the Component One analysis.

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[1]Leon M. Lessinger, "Issues and Insights into Accountability in Education," in Emerging Issues in Education, Ed. by James E. Bruno (Lexington, MA, 1974), p. 234.

For a district of less than 1,000 students, less than five person-days of time should be necessary. For 10,000 students ten to fifteen person-days would be a reasonable allocation, while for a 20,000-student district additional time may be required. As the number of students in the district increases, the systems analysis becomes more time-consuming, partly because of complexity and partly because of the necessity to coordinate the work of several people. Six months may be required to complete the task in a large district, although this estimate takes into consideration that work on the component would be intermittent.

Annual updating of Component One should require little time. For most districts, one person-day might be sufficient.

Component Two. The cost of changing to a program budget will be high unless the district (a) is very small, or (b) shares a system with other districts.[2] If the district is extremely small, transition to a computerized system may not be necessary or even beneficial. Larger districts which join together to share computer programming and maintenance costs probably experience more reasonable cost increments. Generally, it is preferable to train district personnel to use an already developed system rather than to develop an entirely new one.

Once the program budget has been installed and the reports have been programmed and de-bugged, the system should not be appreciably more expensive to operate than a line item system which has been computerized.

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[2]Generally users enrolled in the author's courses have expressed less than enthusiastic opinions about program budgets. Furthermore, they recommend that a high level of aggregation be employed rather than articulating costs at the course level. The primary problem with the programmatic format is that its implementation results in a proliferation of account numbers, and the larger the number of account numbers, the smaller the amount of flexibility available to personnel in the district.

The costs for the River Park district amounted to approximately $25,000.[3]

Component Three. The third component of SPECS is probably the most intricate of the components and the one for which costs are most difficult to assess. One reason for this is that the field test districts implemented Component Three in different subject areas and with different intensity. Indeed, it is likely that no implementation at all took place in some classrooms.[4] Estimating costs is, therefore, a task which will produce imprecise results.

Preparatory activities, including introducing SPECS to teachers, were time-consuming in themselves. This study suggests that two or three hours should be allocated for introducing SPECS to each teacher who will be using Component Three. In addition, preparation time is also necessary for the project coordinator.

Implementation is the most costly phase of installation for Component Three. The major effort for the field test districts was devoted to defining objectives and assessing student achievement. In addition to teacher participation in these activities, meetings were also necessary for coordination of these activities.

All districts in the field test provided some released time or summer workshops for participating teachers. In the large-scale installation at

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[3]This amount is consistent with Knezevich's estimate. The only wide divergence is the reported $6,140 from Stanton, which did not include staff time. Earlier installations were probably more expensive, as in Montgomery County, Maryland, which reportedly spent $150,000 on the task.

[4]For an enlightening discussion of this problem, see W.W. Charters, Jr. and John E. Jones, "On Neglect of the Independent Variable in Program Evaluation," Project MITT, Occasional Paper. (Eugene Oregon: Center for Educational Policy and Management, University of Oregon, 1974).

River Park, where SPECS was mandated for all teachers, enormous time allocations were made on a per-teacher basis--about 132 hours each year for two years--representing a cost of about $3000 for each teacher in the district.[5] Beyond this commitment for River Park were coordination, materials, and consultants, costing $10,500 per year.

Few SPECS sites have implemented Component Three on a districtwide scale. Gilman "used" the SPECS concept to develop an individualized math program. In Anthony, the vocational education department reorganized their courses using Component Three. Mott has taken a "global" approach to developing objectives for all subject areas; however, only some of Mott's teachers have implemented Component Three in their classrooms.[6]

In Mott, direct costs were much less than in River Park and teachers reported spending their own time on Component Three activities. On the other hand, in River Park, one afternoon per week was made available to the teachers for work related to SPECS. If, in fact, SPECS does require additional time, one might assume that teachers would not be willing to invest their own time for the indefinite future. If so, providing release time to teachers for working on SPECS activities, as was done in River Park, may be a better implementation strategy to adopt.

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[5]At $11.44 per hour as described in Chapter II.

[6]Small-scale implementations were often perceived much more favorably by the participants than were large scale implementations. Part of the reason for this was the feeling of ownership among teachers participating in micro-installations. In addition, the worrisome aspect of "teacher evaluation" which pervaded the River Park experience was less visible when only a small portion of the teaching staff were involved.

Another reason for the greater satisfaction experienced by teachers in small-scale implementations was that when they were displeased, the participants were able to terminate their involvement. Such flexibility was not possible when the entire district, including the School Board, was committed to implementation.

The most reasonable conclusions to draw regarding implementation of Component Three seem to be:

(1) Small groups of teachers who implemented Component Three spent small sums of money.

(2) Those districts which took a global approach expended large amounts of both time and money.

(3) Other variables can influence the cost and effectiveness of the implementation so that neither of the above generalizations necessarily hold.

The on-going operation of Component Three is difficult to cost (as indicated in Chapter II) because it has been experienced in only one district at this time. That district reported costs of about $48,000 per year for 1973-74. On a teacher-by-teacher basis this represents about $260 per teacher, plus supervision.[7] This figure, however, does not include inservice time which may have been devoted to SPECS.

Components Four and Five. Data on these activities are sketchy. The best estimate of the costs of implementing these components is that, in general, they do not appear to be sizable.

Unintended consequences. These costs, which have been discussed here are summaries of reported costs. Undoubtedly, they do not include all costs, primarily because the activities and costs often occur in areas already requiring time and money. Therefore, isolating those expenditures which are solely related to SPECS in a district, several statements may be made about the costs of installing any educational innovation:

(1) It will cost as much money as you have to spend.

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[7] $48,000 ÷ 185 = $259.46. This figure does not include a project coordinator.

(2) It can cost the district no incremental amount.

(3) It can cost the district a seemingly endless amount.

In addition, it is important to remember that the amount expended will not necessarily bear any direct relationship to that which is gained.

Recommendations for Further Research

In the process of preparing this report the author encountered a number of areas where further research is obviously important. Although federal policymakers are already aware of each of the areas, they are being reiterated in order to underline their importance.

The most obvious need is the development of a framework for doing cost analyses. The recent publication by the Cooperative Accountability Project of the model developed by Stephen P. Holowenzak and Robert A. Stammer is timely.[8]

Yet this problem is not as crucial as others which are currently under study. Included are needs in the following areas:

(1) More study into the patterns of teacher time usage and the determination of the effect of variation in these patterns on student achievement.

(2) Continued efforts to identify successful strategies for teaching basic skills to all children, but particularly to those whose current skill levels are deficient; and methods which, when replicated, will remain effective.

(3) Continued efforts to refine achievement measures, so that effective strategies, when found will "survive" statistical tests. Present technology is not nearly sensitive enough to systematically reveal marginal effectiveness of interventions.

Pending the satisfactory attainment of the above goals in educational research, the cost-effectiveness tool's usefullness is limited. its utilization must await developments in the educational psychologists' domain.

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[8] An Objective-Referenced Program Cost Model for Educational Management: A Maryland Perspective. (Denver, CO, 1975).

As Emil Haller pointed out,[9] all decisions involve costs. Inasmuch as a program planning, budgeting system involves making many decisions, we may hypothesize that it is more costly than the ad-hoc system which it may replace.

This study attempted to assess the nature and extent of the cases involved though undoubtedly, many non-measurable costs were omitted. Hopefully, it will assist potential users of SPECS, or other PPB systems, in predicting their own costs.

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[9]Emil J. Haller, "Cost Analysis in Educational Program Evaluation," in Evaluation in Education, ed. by W. James Popham (Berkeley, CA, 1974).

APPENDIXES

A. Costs reported by the State Board of Education in assessing the expenditures in River Park.

B. Data Collection Schedule

Questions, analyses of variance, and power analysis from teacher and administrator time study.

Appendix A

Costs Reported in the State Board of Education Task Force Report on the River Park SPECS Implementation*

1. Developmental Costs Borne by District

(a)	Summer extended contracts (Inservice), 1971-73.	$20,000
(b)	In-Service costs, 1974-75.	5,000
(c)	Curriculum Development and Data Program Coordinators salary, 1972-74.	20,000
		$45,000

2. Developmental Costs from Outside District

(a)	CASEA,U of O computer program development, 1971-73.	10,000
(b)	CASEA, U of O consultation, implementation & evaluation of SPECS, 1971-73.	7,500
(c)	State Board of Education for development of system, FY '73.	2,500
(d)	State Board of Education for programming efforts related to serving as pilot district for new accounting system (Handbook II, Revised) FY '74 (to be paid upon completion of required report to BE)	1,500
		$21,500

(Note: CASEA provided these in the form of time and efforts of CASEA personnel; BE provided funds under contracts).

3. On-going Annual Operational Costs for River Park.

(a)	Curriculum development cost above that normally expended.	11,000
(b)	Coordinator's salary (for the project)	10,000
(c)	Program Planning Leaders' release time (for substitutes)	1,000
(d)	Program Planner Leaders' salaries	22,860
		$44,860

(Note: The curriculum development cost represents redirected efforts of teacher rather than added expenditures; the other items represent actual added costs to River Park annually.)

*River Park (fictitious name) represents the SPECS pilot site.

Appendix B

(B-1) Mott Data Collection Schedule

(B-2-B-9) Questions, analyses of variance, and power analysis from teacher and administrator time study.

Table B-1

Mott Data Collection Schedule

1. Thursday, September 8, 1975
2. Monday, October 13, 1975
3. Friday, November 7, 1975
4. Tuesday, December 2, 1975
5. Thursday, January 8, 1976
6. Wednesday, February 4, 1976
7. Monday, March 1, 1976
8. Wednesday, March 17, 1976
9. Friday, April 2, 1976
10. Tuesday, April 13, 1976

TABLE B-2

Minutes Reported Spent Teaching a"Non-SPECS Subject"

1. In your class, about how many minutes did you spend on reading, language arts, writing, spelling, and phonics activities today?

Data Collection	"SPECS" Schools		"Non-SPECS" Schools				Between Schools	Average SPECS Schools	Average Non-SPECS Schools	Significance of post-hoc Contrast
	1	2	3	4	5	6	F			
1	133	162	118	161	114	169	1.53	148	141	
2	105	167	104	207	121	134	4.90*	137	142	No
3.	123	162	128	187	112	136	1.47	143	141	
4	115	176	122	194	97	131	2.86*	146	136	No
5	128	160	139	187	136	107	1.54	144	142	
6	120	135	110	155	109	135	1.56	127	127	
7	138	122	122	175	81	138	2.42	130	129	
8	137	96	146	120	117	212	4.98*	117	149	No
9	116	100	137	189	103	104	2.56*	108	133	No
10	117	102	111	135	46	100	4.48*	110	98	No

*Denotes significance at $\alpha = .05$

TABLE B-3

Minutes Reported Spent Teaching a "SPECS Subject"

2. In your class, about how many minutes did you spend on Math activities today?

Data Collection	"SPECS" Schools		"Non-SPECS" Schools				Between Schools F	Average SPECS Schools	Average Non-SPECS Schools	Significance of post-hoc Contrast
	1	2	3	4	5	6				
1	56	43	44	55	38	57	1.20	50	49	
2	55	46	44	43	43	54	<1	51	46	
3	52	32	48	41	34	38	<1	42	40	
4	59	43	46	70	22	38	1.14	51	44	
5	53	46	49	72	44	41	<1	50	52	
6	57	39	44	37	33	41	<1	48	39	
7	58	37	19	37	31	41	2.81*	48	32	Yes
8	39	41	45	39	31	42	<1	40	39	
9	41	28	39	34	28	37	<1	35	35	
10	69	32	47	53	25	37	3.36*	46	41	No

*Denotes significance at $\alpha = .05$

TABLE B-4

Minutes Reported Spent Planning During the School Day
on a "Non-SPECS Subject"

3. While children were in school today, how many minutes did you spend on all activities related to planning, preparation and evaluation for reading, language arts, writing, spelling and phonics?

Data Collection	"SPECS" Schools		"Non-SPECS" Schools				Between Schools	Average SPECS Schools	Average Non-SPECS Schools	Significance of post-hoc Contrast
	1	2	3	4	5	6	F			
1	62	18	16	63	23	39	2.33	40	35	
2	49	65	19	34	28	38	<1	57	30	
3	50	45	14	56	22	30	1.08	48	31	
4	33	47	30	54	27	36	<1	40	37	
5	32	69	23	43	16	29	1.74	51	28	
6	33	35	25	49	25	36	<1	34	34	
7	27	26	14	50	10	27	2.47*	27	25	No
8	39	39	19	23	19	59	1.31	39	30	
9	79	32	21	54	10	26	6.41*	56	28	No
10	36	27	13	48	13	26	3.61*	32	25	No

*Denotes significance at $\alpha = .05$

TABLE B-5

Minutes Reported Spent Planning During the School Day
on a "SPECS Subject"

4. While your children were in school, about how many minutes did you spend in planning, preparation, and evaluation activities for your mathematics program today?

Data Collection	"SPECS" Schools		"Non-SPECS" Schools				Between Schools F	Average SPECS Schools	Average Non-SPECS Schools	Significance of post-hoc Contrast
	1	2	3	4	5	6				
1	17	10	11	27	16	15	1.22	14	17	
2	24	23	9	18	15	21	<1	24	16	
3	52	15	7	23	16	13	2.75*	34	15	Yes
4	23	19	10	29	12	18	<1	21	17	
5	27	30	9	23	13	18	1.50	29	16	
6	23	19	6	17	15	18	<1	21	14	
7	17	14	2	18	10	17	1.52	16	12	
8	15	23	11	13	6	15	1.09	19	11	
9	22	16	9	20	8	16	1.24	19	13	
10	54	16	6	31	7	18	2.65*	35	16	Yes

*Denotes significance at $\alpha = .05$

TABLE B-6

Minutes Reported Spent on Planning, Preparation and Evaluation Hours After School on a"Non-SPECS Subject"

5. After your students went home yesterday (or Friday, if this is a Monday), and before they came back to class this morning, about how many minutes did you spend on all activities related to planning, preparation and evaluation for reading, language arts, writing, spelling, and phonics?

Data Collection	"SPECS" Schools		"Non-SPECS" Schools				Between Schools F	Average SPECS Schools	Average Non-SPECS Schools	Significance of post-hoc Contrast
	1	2	3	4	5	6				
1	63	91	28	105	36	63	3.67*	77	58	No
2	102	80	42	123	38	54	2.92*	91	64	No
3	70	101	60	86	33	[illegible]	1.62	86	57	
4	29	93	29	64	27	43	3.93*	61	41	No
5	60	68	33	82	44	44	1.25	64	51	
6	45	63	33	64	30	50	1.15	54	44	
7	98	60	29	76	30	41	2.80*	79	44	Yes
8	56	48	31	37	26	66	2.26	52	40	
9	60	42	23	60	34	45	1.68	51	41	
10	56	45	19	84	24	26	3.74*	51	38	No

*Denotes significance at $\alpha = .05$

TABLE B-7

Minutes Reported Spent in Planning, Preparation, and Evaluation
After School Hours for a "SPECS Subject"

6. After your students went home yesterday (or Friday, if this is a Monday), and before they came back to class this morning, about how many minutes did you spend on all activities related to planning, preparation and evaluation in mathematics?

Data Collection	"SPECS" Schools		"Non-SPECS" Schools				Between Schools F	Average SPECS Schools	Average Non-SPECS Schools	Significance of post-hoc Contrast
	1	2	3	4	5	6				
1	36	46	19	38	15	29	1.70	42	25	
2	21	44	14	39	16	38	1.92	33	27	
3	15	29	21	36	21	13	1.59	22	23	
4	17	32	8	32	12	31	1.31	25	21	
5	47	34	7	31	29	26	<1	41	23	
6	13	31	12	47	12	24	2.05	22	24	
7	34	36	7	43	20	22	1.26	35	23	
8	31	23	23	26	7	29	1.27	27	21	
9	32	26	21	23	27	23	<1	29	24	
10	47	29	6	28	22	25	1.73	38	20	

*Denotes significance at $\alpha = .05$

TABLE B-5

Post-hoc Contrasts of Interest
Where Significant Differences Exist

Question Number	Data Collection	t	p(t)
1	2	.29	.77
1	4	- .53	.60
1	8	1.92	.06
1	9	1.21	.23
1	10	- .99	.33
2	7	-2.51*	.02
2	10	-1.36	.18
3	7	-0.13	.89
3	9	-3.15	.003
3	10	-1.09	.28
4	3	-2.62*	.01
4	10	-2.04*	.05
5	1	-1.35	.18
5	2	-1.45	.16
5	4	-1.73	.09
5	7	-2.58*	.01
5	10	-1.05	.30

*Denotes significance at $\alpha = .05$

t is value of contrast between SPECS schools and non-SPECS schools. Where the differences are significant, the difference in amounts of time reported by teachers in SPECS schools and in non-SPECS Schools are unlikely to have occurred by chance.

TABLE B-9

Data From Principals' Survey

Question: After normal duty hours yesterday and before normal duty hours today, about how many minutes did you spend on matters directly related to the operation of your school?

Data Collection	SPECS Schools		Non-SPECS Schools			
	1	2	1	2	3	4
1. Thursday	60	120	0	30	105	75
2. Monday	60	240	80	0	90	0
3. Friday	30	0	20	20	100	60
4. Tuesday	45	60	300	0	45	90
5. Thursday	45	180	75	0	75	45
6. Wednesday	0	0	30	0	30	0
7. Monday	68	0	60	0	25	0
8. Wednesday	80	0	195	0	60	0
9. Friday	40	0	60	0	0	180
10. Tuesday	30	100	105	0	90	60

Post-hoc contrast:

$$\hat{\psi} = (45.8 + 70.0) - \left(\frac{92.5}{2} + \frac{5.0}{2} + \frac{62.0}{2} + \frac{51.0}{2}\right) + 10.55$$

$$SE^2_{\psi} = (MSW)\left[\frac{1^2}{10} + \frac{1^2}{10} - \frac{\frac{1}{2}^2}{10} - \frac{\frac{1}{2}^2}{10} - \frac{\frac{1}{2}^2}{10} - \frac{\frac{1}{2}^2}{10}\right] = 297.07$$

$SE\ \psi = 17.24$

Scheffe $= \sqrt{5(2.28)} = 3.38$

$\psi = \hat{\psi} \pm (3.38)\ (17.24)$

$\psi = 10.55 \pm 58.27$, not significant

Appendix B (continued)

POWER ANALYSIS

We use statistics to guess about the real world, to inform our ignorance.

A statistical test is made to indicate the probability that the observed event occurred by chance, assuming that there is, in reality, no real difference. The level of significance indicates the probability that there is an error. Of interest also, however, is the chance that the significance test will fail to reveal a difference when, in fact, one exists. This second problem is called power, and a power analysis reveals the probability of what is termed a Type II error.

If one had ample resources, power would be utilized partly to determine the needed sample size. In our case, where the size of the population is determined by other factors, a power analysis can inform us about the probability of a failing to reject the null hypothesis when, in reality, a difference exists. The problem in setting up such an analysis is, of course, determining how big a difference we are interested in.

Let us assume that we are interested in a difference of ten minutes per day, in the amount of time spent by SPECS teachers compared to non-SPECS teachers at the tasks covered in the study.

The answer is found by use of the formula:

$$\text{Power} = p \text{ (rejecting } H_0 \text{ when } H_1 \text{ is true)}$$

$$= p[z < -z(\alpha/2) \mid H_1 \text{ is true}] + p[z > z(\alpha/2) \mid H_1 \text{ is true}]$$

$$= p\left[z < \left(\frac{(0-10)}{\sqrt{\frac{\sigma^2}{14} + \frac{\sigma^2}{27}}}\right) - 1.96\right] + p\left[z > \left(\frac{0-10}{\sqrt{\frac{\sigma^2}{14} + \frac{\sigma^2}{27}}}\right) + 1.96\right]$$

Using this formula, we took the average standard deviation in the samples in each of the tests for each of the six questions. The power for each analysis, derived from the above formula, is given in Table B-10. The Standard Error was found by using an average N of 14 for SPECS schools and 27 for non-SPECS schools. In no case was the probability of getting significance (if the real difference were ten minutes per day) more than one chance in four. Therefore, the analyses of variance were not likely to result in establishing evidence of a shift in the ways teachers spend their time.

Table B-10

Power in each of the Six Analyses of Teacher Time Expenditures (Probability of finding a difference of 10 minutes between SPECS teachers and non-SPECS teachers).

Question	Average Standard Deviation	Power
1	61.59	.0779
2	25.12	.2274
3	33.75	.1467
4	26.90	.2043
5	43.24	.1077
6	32.82	.1535

A similar analysis is appropriate for administrators. The same formula, where the standard deviation for SPECS school administrators is 63.51 and for non-SPECS school administrators, 63.13; and the N's are 20 and 40 respectively, ($p = .084$). We are forced to conclude, therefore, that a Type II error may be present there as well.

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